FOOD HABITS AND NUTRIENT INTAKES IN A SIAMESE RICE VILLAGE

000

STUDIES IN BANG CHAN, 1952-1954

Hazel M. Hauck, Saovanee Sudsaneh and Jane R. Hanks
with the assistance of
Amusith Rajatasilpin, Sapha Ingrasud,
Mary D. Campbell and Dana Thorangkul

Cornell Thailand Project
Interim Reports Series
Number Four

Data Paper: Number 29
Southeast Asia Program
Department of Far Eastern Studies
Cornell University, Ithaca, New York
1958

Price One Dollar

[Title Page] [P. i]

000 THE CORNELL UNIVERSITY SOUTHEAST ASIA PROGRAM

The Southeast Asia Program was organized at Cornell University in the Department of Far Eastern Studies in 1950. It is a teaching and research program of interdisciplinary studies in the humanities, social sciences and some natural sciences. It deals with Southeast Asia as a region, and with the individual countries of the area: Burma, Cambodia, Indonesia, Laos, Malaya, the Philippines, Thailand, and Vietnam.

The activities of the Program are carried on both at Cornell and in Southeast Asia. They include an undergraduate and graduate curriculum at Cornell which provides instruction by specialists in Southeast Asian cultural history and present-day affairs and offers intensive training in each of the major languages of the area. The Program sponsors group research projects on Thailand, on Indonesia, on the Philippines, and on the area's Chinese minorities. At the same time, individual staff and students of the Program have done field research in every Southeast Asia country. Study centers are maintained in Bangkok and Djakarta in addition to special library and other research facilities at Cornell.

A list of Program staff and publications is given at the end of this volume. Information on current course offerings, fellowships, and requirements for degrees will be found in an Announcement of the Department of Far Eastern Studies obtainable from the Director, Southeast Asia Program, Morrill Hall, Cornell University, Ithaca, New York.

FOREWORD

114 The research sector of the Cornell Thailand Project concerned with health, sanitation, nutritional status, and diet has been directed since 1950 by the senior author of this paper, Dr. Hazel M. Hauck, Professor of Food and Nutrition in the New York State College of Home Economics, Cornell
[12] University. In this report, she and two of her colleagues present some of the results of a field research project designed by her and carried out by the authors among the rice farmers of the village of Bang Chan in the central plain of Thailand during 1952, 1953, and 1954. Professor Hauck's account of other aspects of this field investigation was issued in 1956 as Data Paper Number 22 of the Cornell University Southeast Asia Program under the title, *Aspects of Health, Sanitation and Nutritional Status in a Siamese Rice Village*. Since 1948, Thai and Americans have been working in the Bang Chan farming community to define some of the problems involved in changing peasant cultural behavior, including health and food habits.

While in the field in 1952-53, Professor Hauck began the arduous task of systematically collecting detailed data on the diets of a carefully selected sample of Bang Chan villagers. This work was continued during 1953-54 by Miss Saovanee Sudsaneh, the junior author of this report. Her assignment was a demanding one, for once begun there could be little deviation from an established schedule designed to cover diurnal and annual cycles in the preparation and consumption of food. Miss Saovanee together with a suitable companion had to sleep in the village, rise before dawn, and proceed during the dry season by foot, and by boat during the longer wet season to the homes selected for study. Some of these households were situated two or three miles from the Project's village headquarters. Only one could be visited in a day. All homes had to be reached well before pre-daylight breakfast preparations were begun so that equipment could be readied and preliminary observations made. After a year of this dawn to dusk visiting, Miss Saovanee retired to a more normal daily round of post-graduate study in nutrition at Cornell, where she received her M.S. degree in 1956, and at Harvard, where she is a candidate for the doctorate. She plans to return to Thailand to teach and do research in nutrition at Kasetsart University.

The necessary companionship for Miss Saovanee during her field work in Bang Chan, a companionship involving, of course, the same rigorous and taxing schedule, was cheerfully provided by Dr. Jane Richardson Hanks of Bennington College, the third collaborator in the preparation of this report. Dr. Hanks has worked with the Cornell Thailand Project since early

114 1953 as Research Associate in Cultural Anthropology. Her research in the field during 1953-54 and subsequently in the United States, which has been primarily concerned with various aspects of Thai family behavior, has enabled her to contribute valuable data and insights to the present report.

Lauriston Sharp, Director
Cornell Thailand Project

Cornell Research Center
Bangkok, Thailand
November, 1957

ACKNOWLEDGMENTS

122 For the period of her field study, 1952-53, one of us (H.M.H.) received an award for advanced research from the United States Educational (Fulbright) Foundation in Thailand. Another (S.S.), who was field worker with the Cornell Thailand Project during 1953-54, was enabled to come to the United States for graduate study through a travel grant from the same Foundation. She held an assistantship in the Southeast Asia Program at Cornell University 1954-55, and the Anna Cora Smith Scholarship for Research in Home Economics, 1955-56.

114 [744] To their co-workers in the field, Dr. Anusith Rajatesilpin and Miss Sapha Indrasud whose services in connection with the medical inspection were provided by the Food and Drug Administration, Bangkok, through the courtesy of its director, Dr. Yong H. Chutima, the authors express their appreciation.

Most helpful information concerning techniques which might be used in carrying out dietary studies was provided by Miss M. W. Grant of the Applied Nutrition Unit, London School of Tropical Medicine. Dr. Amara Chandrapanond suggested adaptations suitable to the local situation.

The transcription of Thai terms was checked by Mr. Marvin Brown. Dr. W. J. Dress assisted by checking the scientific names of food plants for which the authors had previously obtained identification. Many minor points were cleared up by discussion with Thai students in this country. The help of all these persons is gratefully acknowledged.

Most of all, the authors are indebted to the people of Bang Chan; to all who patiently answered their questions, to Khruu Sawad Sangtong and Khruu Yod Nakon who obtained diet records from children in the third and fourth grades, and especially to the members of the eleven households that participated in the quantitative dietary study. These people not only cooperated generously, but accepted us as friends. For their kindly assistance the authors are deeply grateful.

[p. vi is blank]

CONTENTS

Page

DFO Summary 1
  Introduction 3
  The Community 3
    Location, Climate, Transportation 3
    Home Sites and Houses 5
      General Arrangement 5
      The Kitchen Area 6
    General Social Factors Affecting Nutritional Level . . 7
    The Buddhist Priesthood 9
    Seasonal Activities 11
  General Description of Family Fare in Bang Chan 15
    Sources of Food 15
      Home Production, Storage and Preservation 15
        Rice 15
        Flesh Foods Other than Fish 16
        Fish 17
        Eggs 19
        Vegetables and Fruit 20
      Foods Purchased and Cash Expenditures for Food . . 21
    Sale of Home Produced Foods 25
    Annual Calendar of Foods Commonly Used 25
    Meal Preparation and Service 31
      Processes and Equipment 31
      Persons Responsible for Food Preparation 31
      Meal Patterns and Preparation of Typical Thai Dishes 32
      Meal Service and Techniques of Eating 35
    Snacks 36
    Comments on Foods Eaten by School Children 37
    Family Food Shared with Others 40
    Attitudes Toward Food 42
  Food in Connection with Festivities and Ceremonies . . . 47

CONTENTS (cont.)

Page

(VI)Quantitative Dietary Study: Foods Eaten and Estimated Nutrient Intake of Selected Families in Bang Chan . . 54

Procedure 54
  Selection of the Sample 54
  Estimation of Caloric and Nutrient Allowances . . 55
  Method of Collecting Data 57
  Calculation of Nutritive Value of the Diets . . . 59

Results and Discussion 61
  Socio-economic Situation of the Two Groups of Households Studied 61
    General Socio-economic Conditions 61
    Cash Expenditures for Food 63
    Home Production of Food 64
      Rice 64
      Fruits and Vegetables 64
      Eggs and poultry 67
      Fish 67
    Preservation of Foods at Home 67
      Dried Fish 67
      Fermented Fish 67
      Shrimp Paste 67
      Fishsoy 67
      Buffalo Meat 67
  Comparison of Caloric and Nutrient Intakes of the Two Groups With Each Other and With the Estimated Allowances 67
  Contribution of Food Groups and Certain Common Foods to the Nutritive Values of the Diets . . 70
    Contribution of Food Groups and Individual Foods 70
      Rice and Other Cereals 70
      Animal Products Other than Pork Fat 72
      Vegetables 73
      Fruit 73
      Fats and Oils 74
      Sugar 74
      Spices 74
      Alcoholic Beverages 74
    Summary of Nutrient Contributions of Foods Commonly Eaten in Two Groups of Households 74
    Contribution of Snacks to the Nutrient Content of Diets 77

CONTENTS (cont.)

Page

COC

Results and Discussion (cont.)
    Seasonal Variation in Food Preparation, Meal Patterns, Food Costs and Calorie and Nutrient Value of Foods Eaten 77
        Number of Meals Prepared 77
        Time for Meal Preparation and Number of Dishes Prepared 79
        Cost of Food Purchased 79
        Caloric and Nutrient Value of Food Eaten . . 79

Some Recommendations for Improvement of Diet and Nutriture Among Residents of Bang Chan 81

References Cited 89

Sources of Nutrient Values for Foods Used in Bang Chan. 92

APPENDIX A

Description of the Kitchen and Some Notes on Food Preparation in a Relatively Prosperous Household . . 93

Description of Food Preparation Area in a Relatively Poor Household 94

Notes on Meal Service 95

Equipment Used for Food Preparation 96

Equipment Used in Serving Food and Eating 96

Examples of Notes on Food Eaten by Individuals 97

Examples of Diet Records Submitted by School Children . 98

Notes on Tilápia Culture in Bang Chan 101

Notes on Mushroom Culture in Bang Chan 101

Food for Homage-to-the-Teacher Rite Performed by a Buddhist Priest Who Was a Traditional Practioner . . 102

CONTENTS (cont.)

Page

APPENDIX B

000Table 16. Estimated Dietary Allowances for Residents of Bang Chan 104

Table 17. Estimated Dietary Allowances for Persons in Two Groups of Households Participating in the Dietary Study, Bang Chan, 1953-54 . . 105

Table 18. Average per Capita Dietary Allowances for Persons in Two Groups of Households Participating in the Dietary Study, by Round and for the Year, Bang Chan, 1953-54 108

APPENDIX C

Guides Prepared for the Observer Who Carried Out the Dietary Study 109

Preliminary Visit to Participating Households . . . 109

Dietary Survey Proper: General Procedures With Alternative Suggestions 110
Twenty-four Hour Period 110
Number of Visits 110
Scheduling of Visits 111

Directions for Use of Schedule 8 on Which Data Obtained During the Dietary Study are to be Recorded 111

Schedule for Dietary Studies 116

Form for Calculating Raw Weights of Foods Eaten 121

Nutritive Value of Total Foods Eaten in 24 Hours . . . 122

Foods for Which Values Were Obtained from Miscellaneous Sources, or Imputed by the Authors 124

Foods for Which Nutritive Values Were Not Calculated and the Total Amounts Eaten by Two Groups of Households Throughout the Study 125

List of Foods Included in Each Food Group (with some scientific names) 126

Notes on the Preparation and Nutritive Value of Coconut Milk and Coconut Cream 128

LIST OF CHARTS AND TABLES IN TEXT

000Chart No. Page

1. Seasonal Cycle - Bang Chan, Thailand, 1953-54 12
2. Annual Calendar of Fresh Foods Commonly Used in Bang Chan 26

Table No.

1. Mean Annual Consumption and Cost of Purchased Foods, for 106 Households in Bang Chan, 1953 22
2. Division of Food Expenditures by Food Groups, for Eleven Families that Participated in the Dietary Study, 1953-54 23
3. Number and Percentage of Children Who Ate Snacks and Who Missed Lunch, Arranged by Months in Which Records Were Obtained . . . 37
4. Frequency of Occurrence of Various Food Groups in the Daily Diet of 147 School Children in Bang Chan 39
5. Diet Classification for 75 School Children in Bang Chan, and Percentage of Children With Each Diet Classification Who Missed Lunch . 40
6. Persons in the Two Groups of Families in the Dietary Survey, Matched According to Age and Sex, So Far As Possible 56
7. Order and Dates of Visits to Households Participating in the Dietary Study 58
8. Summary of Economic Conditions of the Two Groups of Households Participating in Dietary Study 62
9. Use of Home-milled and Polished Rice by Households Participating in the Dietary Study 65
10. List of Edible Plants Grown by the Two Groups of Households Studied 66

7

LIST OF CHARTS AND TABLES IN TEXT (cont.)

000 Table No. Page

11. Comparison of Calories and Nutrients Available to Groups A and B, With Each Other and With the Estimated Allowances 68

12. Percentage of Total Caloric and Nutrient Intakes Provided by Each Food Group 71

13. Contributions in Terms of Calories and Nutrients of Selected Foods Commonly Eaten by Groups A and B 75

14. Summary Concerning Meal Preparation, by Rounds for Two Groups of Households Studied . . . 78

15. Seasonal Variation in the Average per Capita Intake per Day of Calories and Nutrients, by Two Groups of Households 80

SUMMARY

A general description is given of conditions in a
105 Siamese rice village, 1952-54, as they relate to food supply
26 and food habits. Activities at various seasons of the year
[220] are described. The heavy work seasons occurred during transplanting and harvest. In the dry season, many ceremonials and festivals were held in which food played an important role. Such occasions provided opportunity to "make merit" and add to one's prestige as did the regular offering of food to the priests, throughout the year. The relatively large financial obligations undertaken by those sponsoring ceremonies was a major factor in the economy of the village.

105 Food was mostly home produced and an important factor
262 in the standard of living was the number of productive hands
433 available. Rice was the first essential for any meal. Home milled rice was used, even in part, only by a minority of households. Fish, fresh or preserved, was the food next in importance to rice. Use of flesh foods other than fish was probably inhibited by Buddhist tenets which prohibit the taking of life, but some poultry, oxen, and other flesh foods
[235] were used. Nearly all of the families in Bang Chan raised
[433] chickens, and some raised ducks, but about 3/5 of all eggs produced were sold. Every family had some sort of kitchen
[244] garden, including banana trees and other plants, but spices
[245] and chili were much more commonly grown than vegetables and fruit. Swamp cabbage, the green leafy vegetable used most
[222] often, grew wild in the canals. A calendar of fresh foods commonly used in Bang Chan is presented.

[443] Cash expenditures for food were small. When canals were navigable, boat venders brought produce and during the busy work seasons farmers often bought fish as well as the usual foods: onions, garlic, limes, coconut, palm sugar and small amounts of vegetables.

[434] Many households increased their income by the sale of eggs, vegetables gathered from the canal and other items.
[178] Culture of tilapia and mushrooms, begun during the period of study, was undertaken by a considerable number of farmers between 1953 and 1955. Both enterprises were apparently regarded primarily as a supplementary source of cash rather than as a means of improving the home food supply, and both efforts had been largely if not entirely abandoned by 1957.

Preparation of some typical dishes, meal service and
105 techniques of eating are described. For adults, two meals a
264 day were usual, except during the busy work seasons when a third meal might be eaten. Menus were similar for all. Two observations from records of school children were 1) that over 90% of them ate snacks, many of which were bought from venders on the school grounds. Sweets and fruit were the

Sweets and fruit were the
105 items most commonly eaten. Fruits were seldom eaten except as
262 snacks.

271 The customary beverage with meals was untreated water.
105 Rain water was preferred for drinking, but for 3 or 4 months of the year, water from the canal or fish pond was used.

105 Attitudes toward food, and foods considered appropriate
262 for the very young, the old, for the pregnant or nursing woman and for use during illness, are briefly discussed.

105 Quantitative food intake for 11 families was recorded
126 on a total of 44 survey days distributed throughout the year.
146 Two groups of families, in which individuals were matched so far as possible as to age and sex, were selected on the basis of apparent difference in nutriture. The sample was not stratified with respect to economic conditions, but those in Group B, chosen for apparently better nutriture proved to be, in general, more prosperous than those in Group A, chosen because of signs of poor nutrition.

105 Food values were calculated on the basis of published
146 analyses. Conservative nutrient allowances were estimated for residents of Bang Chan. On the average, calories, protein, iron, niacin and ascorbic acid in the diets of persons in Group B approximated or exceeded these allowances. For Group A, this was true for niacin and ascorbic acid only. Average intakes of riboflavin were estimated to be about 1/3 or less of the allowances, and estimates of calcium intake were about 20% of the allowance for Group A and 30% of that for Group B. Vitamin A values of diets for both groups appeared to be low, and thiamine intakes marginal or low. The signs observed among persons in these families were generally those associated with low intakes of thiamine, riboflavin and vitamin A.

Rice contributed about 4/5 of the calories and over half the protein in diets of both groups. Animal foods, chiefly fish, furnished about 2/5 of the protein. Intake of fats and sugar was small. Snacks of fruit contributed about 1/6 of the total ascorbic acid for Group A, and about 1/9 for Group B.

Seasonal variations in food preparation, meal patterns, food costs and caloric and nutrient values of foods eaten are discussed. Higher caloric intake during heavy work seasons was largely accounted for by larger amounts of rice eaten. The highest intake of protein for both groups occurred in the post-harvest season, when fish ponds were drained.

Questions for further study are proposed, and possible approaches to improving food habits and nutritional status in Bang Chan are suggested.

INTRODUCTION

121 This study of food habits and nutrient intakes in a
Siamese rice village was undertaken in connection with the
Cornell Thailand Project. The project is one of several
under the auspices of the Department of Sociology and Anthro-
pology, which are focused on the process of cultural change
114 in non-industrialized societies. Dietary studies designed to
contribute to a base-line description of the community were
carried out from September, 1952 through May, 1954. Local
headquarters, where members of the research group kept equip-
ment, and could stay overnight, were maintained in the village.

128 The observations to be reported fall into two general
categories: 1) descriptive information concerning many
aspects of the food situation in Bang Chan and 2) quantita-
tive information on food intake, and its estimated nutrient
126 value, for 11 selected families. Qualitative information on
food in Bang Chan was obtained from several sources: 1) field
notes made by various members of the Cornell research group,
2) structured interviews with mothers about their own food,
and that of small children in the family, 3) records of food
eaten during 24-hour periods, submitted by children in the
third and fourth grades of the elementary school as homework
for the health class, and 4) weighed dietary studies carried
114 out in 11 selected households. Quantitative information on
food intakes was obtained from the latter source only. Most
of the data to be presented were obtained between September
1952 and June 1954, but supplementary information was obtained
from a diary for 1955, kept by a school teacher at the request
of the research group, a study of innovations made by Ralis
in May 1955 (Goldsen and Ralis, 1957) and information pro-
vided at our request by members of the Cornell research group
who were in Thailand in the summer of 1957.

A general account of the economic, political and social organization of Bang Chan in 1948-49, together with some material on health and diet was given in the first interim report issued on the Thailand Project (Sharp et al., 1953). The second interim report concerned aspects of health, sanitation and nutritional status in Bang Chan in 1952-54 (Hauck, 1956), and the third was a report on factors related to acceptance of innovations (Goldsen and Ralis, 1957).

THE COMMUNITY

Location, Climate, Transportation

131 Bang Chan is situated in the rice-producing area of central Thailand, about twenty miles by road northeast of Bangkok.

132 Bangkok. The tropical monsoon climate divides the year into
three seasons, a hot, wet season from late May to November, a
cooler, dry season from December to early February, and a hot,
361 dry season from late February to mid-May. The community,
scattered over an area of approximately five square miles, was
161 composed of seven neighboring hamlets. In 1954, the population
162 was approximately [illegible]00, divided among 336 households. About
60 per cent of the households were made up of independent families, parents with unmarried children, with an average family
[963] size of 5.7 persons. The main occupation of 80 per cent of all
families was rice farming.

243 The climate together with the overflowing Chao Phraya
[13] river, provided natural conditions for raising a single crop
of wet rice. From May or June to February, the principal activ-
[221] ities were those connected with rice production. This crop
greatly exceeded the needs for local consumption as human food,
[433] feed, and seed. The surplus of rice which was sold, was estimated for 1953 as 1.4 times the amount used for all purposes
within the village (Janlekha, 1955).

346 Wat Bang Chan, the Buddhist monastery and place for re-
621 ligious exercises, was also the center of social life in the
[795] community. When data for this study were being gathered, the
one primary school in the village was located on the grounds
of the wat. The community was defined simply by the clientele
which patronized Wat Bang Chan and this elementary school.
[563] Within the area of the community lived a small minority of Thai
Moslems who patronized a mosque and school just outside Bang
Chan. The few Chinese in the village were considered as part
of the Thai-Buddhist community. Information to be presented
[128] on food habits refers primarily to habits of the Buddhist majority, although some reference will be made to ways in which
Moslem practices differed therefrom.

193 Although for six or more months of the year the fields
243 were covered with water, sometimes to a depth of a meter or
491 more, a year-round road, connecting Bangkok and Minburi, the
nearest market town, ran through one edge of the village. Bus
484 581 service was available along this road, to either Bangkok or
[494] Minburi but within the community one went by boat on the network of canals during the wet season, and during the dry season,
[503] on foot along the dikes or across fields. From late January
through May, when subsidiary canals were apt to be dry, getting
about was somewhat difficult. Boat travel was considered easy,
but as many families had only one boat, a trip to the store or
even to a neighbor's home had to be planned with reference to
the activities of other family members.

443 Large scale purchases, as for a ceremony, were always
made at a big market, but in general, instead of people going
to the market-town, the "market" came to the people. Boat-venders brought not only fresh produce and staples but also
sweets, ices, soft drinks, and cooked foods such as Chinese

443 noodles. Their prices were higher than in Minburi or Bangkok,
but their service was such a convenience that many people
rarely went to town. Some adults in Bang Chan had never been
to Bangkok though almost all had visited Minburi, about 3
[437] miles from the temple. Venders often extended credit, and
also accepted items such as fresh fish, fruit, and eggs on a
barter basis, thus providing an outlet for small amounts of
home products. When the subsidiary canals were dry, however,
venders could not get to some parts of the village.

Home Sites and Houses

General Arrangement

361 Since the canals provided the chief means of local
487 transportation for much of the year, and also supplied water
for many household uses, houses were built near the canal,
usually within sight of a neighbor's. Home sites were
mounded up to a level of two or three feet above that of the
fields, but even so, water might cover the mound at the peak
of the rainy season. Old wooden houses were set in a grove
of bamboo, bananas and other fruit trees and vines, occasionally
343 betel and coconut palms. Nearby might be a shed for
the water buffalo which were the draught animals used in farming.
Rarely one saw a walled privy.[1] On the same mound
might be a cottage built by parents for married children or
by an affluent farmer for a hired hand. In this case, the
threshing floor, firewood from trees on the mound, and area
342 for kitchen garden would be shared. Many houses were built
on stilts to avoid flooding when the water level was high.
If the house was elevated sufficiently, the area underneath
provided a relatively cool shelter during the hot season for
the buffalo, and even for family members for some of their
daytime activities.

Depending on the resources of the family, houses were
built of either thatch or wood, roofed with thatch, galvanized
352 iron or occasionally, tile. Split bamboo or matting
might be used for dividing walls if the house had more than
one room. Wooden flooring was usual, but in simpler thatched
houses with dirt floors, the buffalo might be sheltered under
the same roof with the family. In such a house, one or more
low wooden platforms were built for sitting and sleeping.
Wide cracks between floor boards conveniently permitted betel
364 chewers to spit without the need for a spittoon. Those who
264 were preparing food or clearing up after a meal could also
thus discard refuse or dispose of leftover food that was to
364 be given to chickens, without leaving the kitchen. Some

---

[1] cf. Hauck, 1956, p. 45-6 for description of latrine facilities.

364 garbage was customarily fed to animals. As previously reported (Hauck, 1956) "Each family seemed to have its own pattern for disposal of garbage which was not fed to stock. Those who threw it in the canal, did so consistently, except when the nearby canal was dry, and those who threw garbage elsewhere, did this consistently. No one was observed to burn or bury garbage."

The Kitchen Area

354 In the larger houses, the kitchen was usually a small separate room with a wooden floor and at least one window for ventilation. A low table or wooden case with sides built up several inches, and filled with clay, served as the "fireplace." On this stood the clay stove, and hot pans and pots were set there when removed from the fire. In homes with an earthen floor, the fireplace might be built directly on the ground. The clay stove was several inches high, shaped so that rice pots and curved frying pans would fit into the large segment of a circle which was its top. An open space was left in front to facilitate building and maintaining the fire. Firewood was kept nearby. Most families also had a portable clay stove in which charcoal was burned. This might be used as an auxiliary unit, for outdoor cooking on a hot day or when traveling by boat.

Matches, although available, were hard to protect from dampness. Kerosene filled cigarette lighters of a cheap and efficient type were commonly used. As kindling, one might use coconut husks or purchase resinous bits of wood that would hold a flame for sometime.

Although only a small amount of firewood was needed, as it was used for cooking only, local supplies were inadequate. In all seasons, some was brought in from other areas. One family participating in the survey planted trees each year for firewood. The wife in another household used to return to her parents' home to gather a boatload of wood as needed. Because charcoal was more expensive than wood, and none was produced in the village, it was used for home cooking by only about 10 per cent of the village families, primarily those such as storekeepers and venders who did not have time to cut firewood.

352 251 In many kitchens clean dishes were placed upside down on a slatted wooden rack. The other common item of furniture was a free standing ventilated cupboard or food safe. At its best, this was screened, and the legs antproofed in some way, as by putting them into small containers partially filled with kerosene, or rubbing them with powdered pitch; but relatively few
251 village families had such well constructed food safes. Families that did not own a food safe often kept leftover cooked foods in a basket, or covered with large dishes on a tray. Fish and sugar must be kept away from ants, but cooked rice,

251 which did not attract them could be left anywhere out of reach of dogs. Raw rice was stored in a large jar or oil can while salt, fermented fish, shrimp paste[1] and fishsoy[1] were kept in smaller jars or bottles. Such containers were customarily covered. Dried food materials such as onions, garlic, chili peppers and other seasonings were often kept in a basket hung from the roof. Paddy, i.e. unhusked rice, was kept in a large bin of matting or wood, the excess sometimes simply piled on an uncovered mat on the floor.

128 Descriptions of two kitchens, one in a relatively prosperous household and one in a poorer home in Bang Chan, are included in excerpts from field notes, Appendix A, p. 93.

312 In a few homes, a clay water jar was kept in the kitchen or nearby, but more frequently foods were washed, and cooking water obtained at the canal or fish pond.

The water level varied between heavy flood and threatened drought. There were no deep wells in the whole area. Rainwater was collected from the roofs and stored in jars, but during the dry season, the canal or fishpond, although low, must supply the needs of the household. In some, drinking water drawn from the fishpond was preferred, and an effort might be made to keep buffalo from wallowing in it, and to avoid contaminating it with fecal or food wastes or by bathing. Others considered the moving water of the canal preferable to pond water.

General Social Factors Affecting Nutritional Level

462 In Bang Chan, most farm and household tasks were shared by men and women. Both sexes plowed, planted, harvested and dealt with rice buyers; managed buffaloes, boats, and children; cooked, fished and cut wood for fuel; hired out as labor hands, "living in" if desired.

554
184 Though there were clear differences in socio-economic status, the daily life of the people was much alike: whether owners of land or renters, whether farming large or small acreages, the rich and the poor worked in the fields at the same tasks, produced or gathered much of their sustenance, and ran out of cash periodically. Socio-economic status was roughly defined in terms of food: a poor man "had one meal only to forego another;" a rich man "had or could get what he wanted to eat." (Sharp et al. 1953, p. 264.)

---

[1] Description of these products will be found on pp. 17-18.

594 What differences in circumstances existed that might
affect nutritional level? On the one hand were relatively isolated
nuclear families, which we estimated as 15-20% of the
434 families, living in tiny separate cottages.[1] Usually with inadequate
444 or no land, they earned an irregular income by hiring
423 themselves out for farm or other work. At the other extreme,
in a hamlet-like cluster of dwellings, lived a closely affiliated
596 group of kin. A senior couple more or less headed the
592 married sisters, brothers, or children, maybe with a hired man,
476 or family that as autonomous households cooperated amicably in
economic and domestic tasks. We estimated these as 20-25% of
the Bang Chan families. The larger social unit, having more
hands to produce, and to share tasks, was better able to provide
good food and general health care to its members, than a
small isolated family. Four problems more easily handled by
the larger group were household chores and child-care, farming,
borrowing, and earning money.

855 Young children had to be constantly tended lest they
fall into the water, the fire, or under the buffalo's feet.
They never entered the fields during work. Fishing and gathering
of water plants was complicated because in boats, small
children had to be held. Where there were but two parents and
young children, one parent could not do many things until the
other came home. Perhaps neither partner could stay away long
enough to get a big batch of fish or greens from the canal, or
[252] go to the store. Cooking was simplified, or food might be
prepared once a day only. Respite came only when the first
born was able to help oversee a younger child, sometimes staying
596 home from school to do so. Where the adult cooperative
476 group was larger, movement was freer. All the strong adults
could work in the fields or at a job, confident that the home
was well tended. They came home to a well-prepared meal, ready
when they wanted it. Such households had more fresh fish because
farm work could be completed sooner, hence more persons
[871] could devote themselves to fishing. Some physically able
members could even be spared and financed to go beyond the required
four grades of elementary school.

241 Plowing could be done by a man and wife, but for both
462 transplanting and harvesting which had to be done within a few
476 days, large groups were necessary. Two patterns of auxiliary
464 group labor prevailed: reciprocal cooperative work, and hiring
of labor.

113
114 1. Janlekha, 1955, categorized families as 5% "one-
162 person," 59% nuclear, 8% limited extended (including one or
594 more parents of a spouse), 27% extended (including dependent
596 married couples or other collateral relatives), and the temple
423 residents. At least 32% of the families had inadequate or no
land. His figures do not indicate the degree of domestic
cooperation which was an ameliorating factor in well-being.

426 Because of scattered farms and frequent shortage of cash, borrowing food and other items, and many exchanges of service were necessary. Blood-kin were easier to approach, and in the larger social unit, nearer. Borrowing from a non-kin neighbor was supposed to be less frequent, and the favor had to be returned more promptly and exactly.

434 Most opportunities for increasing cash income such as hiring out as temporary farm labor, digging canals, marketing eggs, mushrooms, or cooked snacks, took one out of the home, often overnight. In the small family, one partner was left at home. Both could not go because fear of theft forbade leaving a home unoccupied for any length of time.

The Buddhist Priesthood

792 At the temple lived twenty or thirty priests under the abbot, with a group of boys to serve them. The priesthood was maintained by daily voluntary offerings of food, with larger donations of food and commodities at certain times. Persons who thus "made merit," by supporting the priesthood, by giving to the needy, and adhering to the ethical tenets of the Buddhist religion, reaped a reward of health, happiness, wealth and eventually, freedom from rebirth. The immediacy of these beliefs must not be underestimated. Men only were ordained. They might resign at any time after three months, but some spent their lives in the priesthood.

792 262 431 In Bang Chan, throughout the year, the priests set out at dawn to receive cooked food for the day. They appeared at houses by more or less specific arrangement and were given a generous share of the food prepared by the family for its own use, sometimes with the addition of fruit and other delicacies. Each priest stopped at two or more houses. The food then was brought to the temple to be eaten at 8 and 11. For the rest of the day the priests fasted, i.e. they ate no solid food, but drank liquids such as tea, soft drinks, and recently, tinned milk and a fortified malted milk drink. Priests were also invited to eat in homes not only at large ceremonies, but at small merit-making occasions. Sporadic special food offerings were also received. If a buffalo died, much of the meat was usually given to the temple. Traditional practitioners, mid-wives, and ceremonialists always gave the priests a portion of the fees from their practice which consisted in 1 or 2 liters of milled rice, a bunch of bananas, and perhaps cash. On the numerous Buddhist holidays and at specially organized temple convocations, quantities of cooked, preserved and raw foods were brought to the temple and apportioned among the priests. From this bounty a meal was served to the priests, who ate while the villagers looked on in satisfaction.

One of the duties of the abbot was to coordinate the

792 village offers of regular service, the holiday offerings, home
262 invitations and sporadic gifts so that all priests had places
431 to go, no one had much more than any other, and that the whole temple did not undergo periods of undue glut[1] or hardship.

792 About mid-July, Buddhist Lent changed the food habits
796 somewhat. This three-month period corresponded with the height
262 of the rainy season. Priests did not leave the temple to gather offerings on rainy mornings, but younger priests, assisted by the temple boys, cooked meals from supplies on hand. On the first day of Lent, people brought less perishable foods: green bananas, coconuts, sugar cane, pomelo, sweet potatoes, taro, onions, garlic, salt, sugar, [illegible]y salted beef paste, dried fish, canned goods, and milled rice. During Lent fresh or cooked foods were brought in, and some ladies volunteered to cook for varying periods of time. On a holiday in September, families made up such quantities of a sweet of "puffed" glutinous rice, sesame seed, and peanuts pounded and held together with sirup and sometimes covered with grated coconut that priests were tired of it and many children got diarrhea from overeating of it.

In mid-October, the Lenten restrictions ended with another holiday offering, and thereafter the priests went regularly on their appointed rounds.

796 On Buddhist holidays, the people did not usually eat any
261 of the food brought to the temple, but on (3)thauaud (2)ka-(5)thin[2], an all-day festival held in October or November, after feeding the priests, the people also ate bounteously.

792 Residing at Wat Bang Chan in 1954 were 22 boys, aged 10
857 to 16, sent to serve the priests, get their living and attend
262 school. Most of them were from poor or disorganized homes. They shared the food offerings from which they received three meals a day. Among the children's food records, the food listed by these boys as eaten the day before was comparatively diverse.

---

792 [1] Amounts of food given usually exceeded the actual
262 needs of the priests and temple boys. One instance was noted
737 in which food was sent by the priests to a needy old person
235 nearby. Leftover rice was dried and sold for chicken feed.

114 [2] The transcription used throughout this report is
104 that described by Sharp et al., 1953, pp. 12-15. Numbers in parentheses represent the different tones of the syllables.

Seasonal Activities

128 A chart has been prepared to show the climatic conditions in Bang Chan and what people were doing at different seasons (Chart 1). For convenience, the periods covered by the four rounds of the dietary survey (p. 58) are included.

221 The year starts with May, the beginning of the rice-
132 year. At this time the rains began to soften the parched
ground, and the heat slackened. School re-opened. Farmers
241 turned to plowing, harrowing, raising the seedlings. Both
512 sexes worked about equally in field labor, boys from 14 and
[871] girls from about 15 years of age performing tasks according
[462] to skill and strength. Everyone was in the field at dawn.
[883] The buffalo, but not the farmer, rested through the noonday
heat (about 10 a.m. until 2 p.m.) and also on the weekly holy
264 day. Meals were usually eaten about 10 a.m. and after re-
turning from the field at dark. Although two meals a day
were usual at other times, at this season, some had a third
[262] meal about 2 p.m. If the buffalo were brought home to rest,
this meal could be eaten at home, but hired laborers or those
working far from home often took with them rice and other
foods in a (2)pin-(1)too, or tiered lunch kit.

221 With the rains, the canals had filled, so that by June
132 buyers with big rice boats could return. The few farmers who
[501] could afford to hold onto a portion of their last year's crop
[443] sold it for a better price at this time. Vegetables and
[241] fruits which had died in the long drought were replaced, and
trees were planted.

241 In July the heavy transplanting season began. Because
of cooperative work habits or hiring out, people worked
221 solidly day after day for two months on their own or on an-
132 other's fields. It was dawn-to-dark, back-breaking work.

This was an anxious time. The seedlings had to go in
at exactly the right time. Water level was only partly con-
[312] trollable. Lack of rain might be remedied by pumping water
from the canals but flooding would drown the plants. School
[871] vacation was scheduled at this time so both teachers and
[857] children could help. Older children might work in the fields,
[887] while younger ones, from 8 to 13, and the aged took over the
care of babies and toddlers, fished, cooked, gathered food
[438] for the family and grass for the buffalo. People knew the
crop was subject to drought and flood, pests of rats and
worms, destruction by birds or wandering buffalo or duck, and
in the end to the mysterious fluctuations of the price of
rice on the world market. Moreover, some persons worried
about debts, acquired from giving a ceremony or making a
capital investment and sometimes from heavy gambling during
the rest season.

221 132 243 244 245 262 434 503 796 871

Chart 1. SEASONAL CYCLE - BANG CHAN, THAILAND, 1953-54

	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
Season	-→ ←--------------------WET------------------→							←-----COOL------→			←----HOT-----	
Temperature (°C)[1]	30	29	28	29	29	28	26	25	25	28	30	30
Humidity, rel., %	77	80	81	81	80	78	74	70	70	65	66	67
Rainfall	---→	heavy	moderate	←---heavy---→		←------light-----→		←-------negligible--------				
Canals		rising			high	(floods)			lowering fast			low,dry
Cultivation of Rice	plowing-------→ seedbed grown		TRANSPLANTING			growing	early var. mature ←----------HARVEST--------→					
School			vacation						vacation		vacation	
Cash available	cash in hand--------------					←-----cash shortage-----→				cash in hand--		
Source		rice			cash jobs----------→				main rice sale			
Fruit;vegetables	--→	←-new planting-→							←-----annuals die-----			
Fish: Supplies	ponds drained-→							←-----ponds drained-------				
Maturation			←-------many varieties-----------→						←---best varieties---→			
Preserving	←----much----→		←--------------moderate----------------→						←----------most-------→			
Ceremonies	ceremonies-------→		←-----Buddhist Lent-----→							←--ceremonies---		
Dietary survey	--→ ←-----Round I------→			←--------Round II-------→				←----Round III----→			←--Round IV-	

1. Mean temperatures and relative humidity estiamted from charts for Bangkok and the central plain of Thailand (Bunnag and Dhararak, 1947). Mean monthly temperature range from 25-30°C corresponds to 77-86°F; diurnal variations are greater, averaging 18°F (10°C) in April and 22°F (12°C) in January.

221 Despite the availability of fish and of vegetables in
435 the canal, the highest cash outlays for family food occurred in this transplanting season. Several factors probably contributed to this: increased food energy needs because of long hours of work, venders again accessible because of high water, cash from sale of last year's crop still in hand, the convenience of cooked foods and snacks, and perhaps the need to replenish household supplies after the long drought, or after their depletion by a ceremony.

221 The two months of September and October during which
[512] the rice grew afforded some respite. People slept a little longer and breakfast was not prepared so early. The skilled cook might take over and could give more attention to food preparation. All who could, took the opportunity to visit
[188 and take trips. A few might go on a pilgrimage. Therefore,
264 in this season, all family members were less often together
226 at the evening meal. Fishing was a continuous occupation,
443 with some preserving and home craft. Jobs such as selling
354] food in the market were undertaken for ready cash; houses and equipment were built or repaired. Finally the threshing floor was prepared.

[342 High water caused time-consuming inconvenience only in
133] earth-floored cottages where it was necessary to keep the rice stores and chickens dry, move the cook-stove, and either build plank walks or cook standing ankle deep in water.

243 By November, the earliest varieties of rice matured.
221 Those who owned several rice fields could put at least one into an early type. Many persons, by then short of rice, were glad to be thus tided over. One grandmother divided her first harvest among her several long-since-independent married children; 2 tangs[1] of milled rice per family, 40 for herself.

The heroic labor of harvest occupied December, January, and February. Farmers raced against the all-too-fast lowering of the water in the canals, without which sheaves could
[461] not be moved and buyers could not come for the paddy. People worked all daylight hours in the fields, threshed far into
[226] the night. At this time also many varieties of fish matured and men fished night after night. Just when the convenience
434 of purchased food was greatest, cash was exhausted. With
426 rice money in sight, venders might be generous with credit,
443 but they could navigate only the larger canals, so were not available to many.

000 There was an important psychological difference between

---

[604] [1] One tang equals 20 liters. Milled rice weighs about 16 kg. per tang.

There was an important psychological difference between
221 the two work seasons. At planting time, people were anxious;
243 at harvest they were happy. People saw cash just ahead, for
434 the crop was now safe. Each host of a cooperative work party
466 gave at least one big convivial feast, the best he could pro-
vide and even the hired laborers got a round of liquor. People
527 joked more than usual at work. Two boat loads of workers were
461 observed racing down a canal at 6 a.m., shouting and cheering,
although they had probably worked long hours for days or weeks
before. Everyone knew that a joyous season was at hand.

221 When the crop was in, the people rested, fished, and be-
226 gan to prepare for big ceremonies demanding organized work.
527 Supplies of fish were needed for preserving or for feasts.
Labor and engines were now available, and with water low, fish-
ponds could be conveniently drained, and the fish on the muddy
bottom caught. A pond might be drained two or three times a
year, but timing was determined by the availability of equip-
ment and workers and by the needs of the annual ceremonial
cycle. One pot of fish was given to each helper at a coopera-
tive pond-draining.

221 Most farmers sold their rice in February. Capital was
45 invested in farm equipment, buffalo, housing and ceremonies.
Debts were cleared if possible. Cash expenditures for food,
which had declined progressively since the beginning of the
rice year, reached the yearly minimum, mostly because people
had ample time to fish. People also saved up their money if
they were sponsoring a ceremony, ate lightly at home if they
[871] were going to one. Since school closed from March 15 to May
1, because of the heat, money was not given to children for
snacks.

221 The land dried up and cracked, rainwater for drinking
132 gave out, and some canals were reduced to mud. Cherished
312 plants were kept alive by watering, but no new planting could
241 be done. Buffalo, which at eiher seasons were confined and
231 fed, now roamed the fields, nibbling stubble. Everyone was
busy and happy. Ordinations, weddings, cremations, merit-
making feasts and several big holidays came one after another.
796 Of the four New Year's Lays observed in Bang Chan, the Bud-
hist New Year, which because of the lunar calendar fell about
mid-April, was the most important, being celebrated over two
days with extensive offerings of food to the priests and with
other activities. The official New Year's Day, January 1,
and the traditional New Year's Day about November 1, had rather
[563] slight observances. Chinese New Year's, in February, was
celebrated by the Chinese residents who presented a school
teacher and their hamlet headmen each with a boiled chicken
and a Chinese sweet. Lent officially closed the ceremonial
season, but the advent of plowing-time slowed the pace consid-
erably.

When the rains finally came, the rice year started again.

GENERAL DESCRIPTION OF FAMILY FARE IN BANG CHAN

261 As we turn to a detailed description of the family fare,
101 we should like to point out that starvation was unknown in
Bang Chan. Although much room remains for improvement in
731 diet, "hollow hunger" was uncommon. In the few times when
disastrous flood destroyed the year's crop, the government
was able to provide enough rice so that it need not be ra-
133 tioned. People still ate their fill. Even floods had their
226 advantage: one could fish out the window. That gross caloric
undernutrition was rare was borne out by examination of the
144 school children (Hauck, 1956). "On the average . . . Bang
145 Chan children could not be considered as markedly under-
weight. Few were so thin that one could 'count their ribs'
and still fewer would be considered plump by American
141 standards." In a random sample of village households that
included about 10% of the population, the heaviest man
weighed 69 kg. (151.8 pounds) and the heaviest woman 70 kg.
(154 pounds). We noted no more than half a dozen adults who
appeared to be "overweight." Most were middle aged or older,
and none of them did strenuous field work.

Sources of Food

Home Production, Storage and Preservation

262 Rice. - Rice is an essential part of any Thai meal.
The majority of the rice farmers in Bang Chan had rice for
256 home consumption milled for them at Minburi. In general,
[251] they took their own paddy to the mill, and brought the re-
sulting milled rice home, where it was stored in a box or
mat-bin. Although, according to a recent survey (Goldsen and
Ralis, 1957) nearly a third of the households owned a home
rice mill, undermilled or home-pounded rice was not widely
[26] used in Bang Chan. Information on this point was obtained
for 333 of 336 "kitchen-unit"[1] households in the village. Of
these 5 consumed home-milled rice only, 51 used home-milled
rice in major part, 78 in minor part, and 199 not at all.

221 In households where home-milled rice was used, during
256 June enough would be pounded to last until harvest, at which
time hands were sore and bleeding from the field work and
505 home pounding was impossible. At the time when data for the
256 present report were being gathered, most families took paddy
to the mill when water in the canal was high enough so that
it could be transported by boat. If a farmer on a subsidiary

---

[592] [1] In some large houses, two related family groups lived together but maintained separate kitchens.

256 canal misjudged his needs for milled rice and ran out, he had
505 to mill his own paddy. Since the main canal was deepened in
1953, year-round transportation of rice by boat has been possible for many more farmers, and this may further decrease the consumption of home-milled rice.

256 Of 105 households which had and used a home rice mill,
231 99 used the polishings for feed but no family in Bang Chan
[262] used them for human food (Goldsen and Ralis, 1957). One farmer, headman of a hamlet, who lived near the main canal and
235 the road to Minburi but who used home-milled rice, offered as
256 the reason that the polishings were good chicken feed, and if he took rice to Minburi to be milled, the miller would keep the polishings.

114 As reported by Janlekha (1955) consumption of milled
146 rice in 106 households amounted to about 285 kilograms per
262 capita per year or 780 grams per person per day. Such "house-
433 hold consumption" includes "losses to pests and poultry, daily gifts to priests, contributions to temples and outlays for feasts and rites in undetermined but considerable amounts" (Sharp et al., 1953, pp. 265-266).

262 Flesh Foods Other than Fish. - The people of Bang Chan
231 had a taste and appreciation for flesh food, but the production
784 and use of meat was certainly inhibited by Buddhist tenets which prohibited the taking of life.[1] Killing of poultry, fish, etc. was tolerated among the relatively young, but was considered unsuitable to the aged who should be preoccupied
[792] with living virtuously. People felt, however, that the sin of taking life was condoned if they offered part of an animal to the priests.

Since many villagers were unwilling to slaughter buffaloes even when they become aged and useless, such animals were commonly kept until they died. Animals which had died of old age or disease were not, however, regarded by Thai Buddhists in Bang Chan as unfit for human consumption. Usually they
[792] were cut up and given to the priests. When the buffalo belonging to one family (Household 67)[2] participating in the dietary
[262] survey died, some of the meat was used fresh for curry, much

---

[443] [1] Meat such as water buffalo and pork as well as fish was sold by venders. Since meat was relatively expensive and was usually used in small amounts with other foods, it was offered for sale in chunks which no longer resembled the living animal. Seeing such small quantities spared the sensibilities of the Buddhists who were thus removed a step from the
[184] killing. Actual butchering was done by Moslems or Chinese who did not object.

[24] [2] Households were identified by numbers assigned by lot.

231 was given away fresh to selected kin and friends, including
262 those who helped to butcher, and the remainder was salted
and dried. Of this, 7 kg. were kept and 5 kg. sold. Moslems
were forbidden to eat an animal with two or four legs which
"dies," although eating dead locusts or fish is not forbidden.
Some Moslems in Bang Chan reported offering dead animals to
Buddhists in barter for other materials.

231 Oxen, a sign of prosperity, were bought as calves by
the Moslems and fattened for meat, usually with a ceremony in
mind. In 1955 (Goldsen and Ralis, 1957) only 5 householders
in Bang Chan raised hogs, and 4 of these had 1 or 2 only.
262 Moslems ate no pork. A permit from the district officer was
necessary for slaughtering a buffalo or an ox but not for
hogs. Natural deaths of such animals were supposed to be reported.

235 Poultry was not commonly used for food in Bang Chan.
262 It was the poor man's "feast" food suitable for guests. One
434 couple in the lowest income level killed one chicken or a
duck once a year to provide the traditionally good meal for
their cooperative harvest helpers. Others, better off, might
serve chicken especially at men's dinners. Pigeons were
235 raised for sale in the market by one Moslem family. In 1953-
177 54, one person was trying to raise a few turkeys for sale, as
word had reached Bang Chan that turkeys were in demand for
foreigners' holiday dinners. By 1957 turkey-raising for cash
was spreading, but some villagers objected to having them
around "because they look like vultures and bring misfortune."

224 Various wild creatures were used for food whenever they
225 were caught. Turtle curry was considered a great delicacy,
262 but as turtles, which could be caught from May to February,
brought a good price in Bangkok, experts usually sold their
catch. Frogs and turtles were sometimes kept in a jar until
needed. Eels, frogs, cobra and other snakes were used for
curry. Field rats, available all year, were roasted.

226 Fish. - Next to rice, fish constituted the most abun-
262 dant food in the diet in Bang Chan. Either fresh or pre-
served,[1] they were available throughout the year. Killing

---

251 1. According to observation in 1952-54, fish caught in excess of immediate needs were preserved for later use. Serpentheads ((1)plaa (3)chauaun), which are about 7 or 8 inches long, and pilot fish ((1)plaa (2)sa-(2)lid), about 4 or 5 inches long, were commonly salted and dried. Heads and tails were removed and the fish were split open and salted overnight. The following morning the fish were washed and spread on fiber trays in the sun to dry. Some excess fish might be dried at anytime of year, but larger quantities were done during the hot, dry season. The process was usually complete within a week.

Killing

262 fish was apparently regarded more lightly by many Buddhists
226 than killing of larger animals, but fishing on (1)wan (4)phra,
[794] the weekly holy day, was forbidden. Fish were caught from the canal with nets, traps, spears and hooks. Some were trapped
226 in trenches in the rice fields. Techniques varied with the varieties of fish mature and plentiful at different seasons.[1]
228 Moreover, every house had a fish pond. It was usually the hole from which earth had been removed for mounding the home site, and was connected by a ditch to the canal. Fish were lured from the canal into the pond by clearing it of injurious undergrowth, planting appropriate fish-feeding plants, of

---

251 Smaller fish were preserved as fermented fish. The fish with bones left in, were salted overnight. This product was
[264] called (1)plaa (1)raa. For fermented fish to be used as seasoning, in various dishes, the liquid was drained off, then the fish were washed and mixed with salt and specially prepared rice. This had been soaked overnight, fried and pounded. The mixture was allowed to ferment in a small jar for from 2 weeks to 2 or 3 months, depending on the product desired. Large bones were removed by putting the product through a colander before use. Fermented fish had the advantage that it could be eaten without further preparation, and the flavor was generally liked.

Small shrimp, which were caught in quantity during only about 3 weeks in February, were made into shrimp paste as follows: the shrimp were washed, mixed with salt and allowed to stand overnight. The liquid was drained off, and the shrimp were spread out on trays and exposed to the sun for a day or so. Larger ones might then be beaten to loosen the shells, which could be winnowed away. For very small shrimp, this step was omitted. The shrimp were then pounded thoroughly in a mortar, and stored in a jar for about a month before use. Very small fish were sometimes made into fish paste in the same way. The yield was about 2 kg. of the tannish or grayish colored shrimp paste from 4 baskets (4/5 tang) of shrimp. Shrimp paste or (2)ka-(2)pi was an essential ingredient of Thai hot dishes.

The liquid which was drained off from the mixture of fish or shrimp and salt in the first stage of preparing fermented fish or shrimp paste was used by some villagers to prepare (4)nam (1)plaa or fishsoy. The liquid was boiled with certain green leaves such as mango leaves, onion, garlic and salt for from 30 minutes to an hour, then it was strained.
[263] The resulting red-brown liquid was bottled and was ready for use as a condiment.

[186] 1. Sharp et al. (1953, pp. 185-196) described some common fishing techniques and listed 32 varieties of fish known to be found in Bang Chan in 1948-49.

228 which the leafy vegetable (2)phag (2)ka-(2)cheed is one, and
digging a deep hole at its entry. At the proper time the
opening was plugged. The fish grew in the pool and were
taken as needed, sometimes, for convenience, several at a
time, to be kept alive in a large pot near the house. By
draining the pond fish were "harvested" (p. 12). Yields
varied, but villagers had the impression that they had de-
[254] clined considerably over a period of years.[1] In 1952, at the
suggestion of FAO, the Thai government tried to increase the
supply by introducing tilapia culture. During the first
three years of the experiment about one-third of the families
in Bang Chan had tried to raise tilapia, but in the summer of
1957 members of the research group were told that no one had
persisted (see Appendix A, p. 101).

235 *Eggs*. - Chickens were raised by about 90% of the families in Bang Chan, and over 70% owned 10 or more. In contrast, only 37% of the households had ducks, and only 13% had 10 or more (Goldsen and Ralis, 1957, p. 56). Ducks were regarded as trouble makers. Moreover, chickens could feed "naturally" and certainly helped themselves to paddy from the bin, whereas ducks did not eat paddy, but had to be provided with bran and broken rice.

235 Most of the eggs produced were sold. Janlekha (1955)
443 estimated the annual production of chicken eggs in Bang Chan
433 as 366,540, and that of duck eggs as 268,200 eggs. According
262 to the information which Janlekha obtained from 106 house-
holds in 1953, about 4/5 of the chicken eggs were sold as a
secondary source of farm income whereas more than 3/4 of the
duck eggs were home consumed. Slightly over 2/5 of all eggs
produced in the village were consumed there. On a per capita
basis, the average annual consumption of 708 eggs for an
average family size of 5.7 persons (Janlekha, 1955) amounted
to a little over 1/3 of an egg per day. Home consumption of
eggs might be less in households in which enough chickens
were raised to make regular sale of eggs possible. Thus in
5 of the 31 households studied by Sharp et al. (1953, p. 197)
all hen's eggs produced were consumed at home.[2] For these
families, an average of 452 eggs per family per year or about
1-1/4 egg per family per day, were thus available. Home con-
sumption in the 26 families which sold eggs amounted to an
average of 215 per year or about 0.6 egg per family per day.
One informant commented that a rich man could eat an egg
every day, but she could not afford to do so. She said she
sold eggs, when she had them, and bought foods to eat with
rice.

---

1. Sharp et al., 1953, pp. 191-192.

2. This probably means that eggs were not sold in quantity, not that none were used in barter (cf p. 5); thus the number of eggs available may be overestimated.

244 Vegetables and Fruit. - Although kitchen-gardening has been encouraged by the Thai government, vegetables and fruit were grown in Bang Chan to a limited extent only. Every family had some sort of kitchen garden, but many edible plants which can be grown in the village were grown by relatively few families. [433] The list of fruits grown in Bang Chan in 1948-49 (Sharp et al., 1953) included four times as many items as were grown by one or more of the 11 families that participated in the dietary study. The list of vegetables and spice plants grown or gathered by these families included 27 items, as compared [249] to 41 listed by Sharp et al. Spices and chili were more commonly grown than vegetables and fruit.[1]

244 245 433 One affluent household whose food expenditures for 1949 were reported by Sharp et al., (1953, pp. 214-215) produced for home use, 125 kg. of palm sugar valued at 200 baht and 500 coconuts, valued at 450 baht. Home production of both of these was unusual. Few families in Bang Chan grew either sugar palms or coconut palms and expenditures for coconuts and palm sugar were usual. During the major flood of 1942, villagers noted that coconut palms survived whereas all other fruit trees were destroyed. After this, a number of farmers planted coconut palms, but they had not yet begun to produce.

361 311 [351] In 1954, about 120 acres (300 rai) of the total of about 2800 acres (7000 rai) of land in the village were used for home sites and home gardens for 336 households. Individual home sites usually varied in area from about one-quarter to one acre, and were occupied by buildings, threshing floor and space for poultry as well as trees and garden space. Portions of this might be under water for several months of the year. Increased home production of fruit and vegetables would in many cases necessitate increasing the size of the home site by purchase, mounding or both. Ordinarily, increased land for the kitchen garden was obtained at the expense of some of the

---

[245] [1] In a typical farm garden in Bang Chan one would find bananas growing, and a number of plants used for seasoning [249] curry. Various kinds of chilies, lemongrass, bergamot, of which both rind and leaves are used, and galangal were grown by all families who participated in the dietary study. Both sweet and holy basil were commonly grown. Many families grew one or more varieties of gourds and of eggplant, some of which [262] can be trained to grow on a tree or trellis. The inflorescence of the banana was also used as a vegetable. Leafy vegetables were not commonly cultivated but some families grew (2)phag (2)ka-(2)cheed, a green water plant, in gardens staked out at the edge of the canal, or in a pool, and some had trees, [222] the leaves of which were edible. Swamp cabbage or (2)phag [262] (3)bung grew wild along the edge of the canals and was the most commonly used green leafy vegetable. A few families [245] grew guava, jujube, star gooseberry, Manila tamarind, mango and pineapple.

311 361 [505] rice land. Water-ways, however, were public areas, and any convenient wide spot might be selected as a private garden. It was marked with stakes, and was apparently not disturbed by others.

262 344 433 Mushroom culture as a side line activity of rice farmers developed during the period when this study was in progress. After threshing, in early 1954, two of eleven families that participated in the dietary study started raising mushrooms. Although most of these were sold, both families reported frequent inclusion of mushrooms in the family diet. One informant commented that families that planted mushrooms also ate them almost every day, and said "Adults complain that it is a wearisome food but children still like it." Mushrooms were used fried, with pork, in soup or in curry.

[434] As with tilapia, mushroom culture appears to have been undertaken primarily to increase cash income, and was abandoned when it was no longer profitable financially (see Appendix A, pp. 101-102).

Food Purchased and Cash Expenditures for Food

262 432 Relatively few foods were purchased, but some of these, such as onion, garlic, limes, tamarind, coconut and palm sugar were so frequently used that without cash to buy them, villagers would have considered their diet monotonous. Many had their own supply of fresh and dried chilies, fishsoy, and shrimp paste, which might, however, be inadequate for their needs. Other foods not commonly produced in Bang Chan were purchased for variety.

262 435 128 Estimates of mean annual consumption and cost of purchased foods, for 106 households in Bang Chan are shown in Table 1.

262 432 The list of purchased foods presented by Janlekha (1955) was compiled after preliminary interviews with a number of household heads. It includes the principal food items which were commonly purchased in Bang Chan. In addition to these, the affluent household studied by Sharp et al. (1953) spent appreciable amounts for vegetables (listed as cucumbers, lettuce, cabbage, etc.) and fruit (pineapple, mangoes, melons, etc.) and small amounts for peanuts, soy sauce and vinegar sauce. Eggplant and white radish were bought by more than half the families that participated in the dietary study, and were used on 11 and 8 survey days respectively. Other vegetables and fruits, bought by one or two of the 11 families, and used on not more than 3 of the 44 survey days were: mung beans, snap beans, bean sprouts, Chinese celery, cucumber, leeks, lettuce, mushrooms, sugar cane, sweet potato, taro, turmeric, (2)ma-(1)faj or rambai, Thai nutmeg, orange, pineapple, rambutan, sandorica and watermelon. Salted and pickled white radish and pickled bamboo shoots were the only

[Text continnues on page 23---Analyst]

262
432
435

Table 1. Mean Annual Consumption and Cost of Purchased Foods, for 106 Households[1] in Bang Chan, 1953
(Adapted from Janlekha, 1955, p. 316)

Foods purchased	Estimated Amount	Estimated Cost baht[2]
Raw fish	16.6 kg.	83
Fish sauce (fishsoy)	36 bottles	54
Shrimp paste	6 kg.	27
Pork and beef	8.4 kg.	84
Vegetables	1 kg.	1
Onion[3]	11.3 kg.	34
Garlic[3]	11.3 kg.	34
Coconut[4]	196 fruit	292
Chilies, dried	7.6 kg.	53
Limes[4]	80 fruit	16
Tamarind[4]	6.3 kg.	19
Palm sugar[3]	71.4 kg.	152
White sugar	4 kg.	16
Total		865
Average cost per day		2.53
Average cash expenditure per person per day for food		0.44

---

[1] Average size, 5.7 persons.

[2] At the time of the study, one baht equaled about 5 cents.

[3] Not produced in Bang Chan (Sharp et al., 1953, pp. 295 and 299).

[4] Little production in Bang Chan.

262 432 preserved vegetables which were purchased and used frequently by families participating in the dietary study.

262 435 The food costs reported by Janlekha (1955) were estimates recorded from memory at relatively frequent intervals. The average per capita cost, 0.44 baht per day, was similar to the average cash expenditure of 0.47 baht per person among 11 families participating in the dietary study (based on the average of 4 survey days for each family). Thus, in Bang Chan, cash expenditure for food appeared to be relatively small, i.e. farm families produced a large share of all food consumed. If money were not available to buy, they would still have enough to eat, but it might lack variety. One informant said, for instance, that he usually bought a coconut every other day, but during October, when cash was short, he bought none. Janlekha (1955) considered the estimates obtained for expenditures for fruits and vegetables less reliable than for items purchased more regularly.

262 511 In Table 2, the percentage distribution of food

Table 2. Division of Food Expenditures by Food Groups, for Eleven Families that Participated in the Dietary Study, 1953-54

	A 6 families[1] %	B 5 families[1] %
Animal foods	30.8	39.3
Fruits[2]	30.3	26.3
Vegetables[3]	28.7	17.0
Fats and Oils	3.3	8.4
Sugar	3.6	3.5
Pulses, nuts	--[4]	0.9
Spices, etc.	2.7	--[4]
Miscellaneous	0.7	4.5

1. Based on 4 days per family.

2. Primarily coconut.

3. Chiefly non-leafy

4. The dash indicates no purchase or a value of less than 0.1%.

262 expenditures by food groups is shown for the 11 families that
511 participated in the dietary study.

Consumption of canned foods was negligible. Some canned fish and fruits were on sale at stores in the village, in 1952-54, but were seldom seen in homes.

262 Sweetened condensed milk, which was served in coffee
272 sold at the stores, was occasionally bought for the children.
854 On one occasion, a woman was seen buying milk diluted with
855 hot water as a beverage. Among 526 records of food eaten by
school children during 24 hour periods, milk appeared twice
only, once with coffee. Dried milk, for infant feeding, was
used occasionally. During 1952-54, several instances were
noted in which dried milk, mixed with water, was used to feed
an infant while the mother was at work in the field or engaged
in vending, but we encountered one case only of an infant who
was not breast fed. This was an infant whose mother died when
he was five days old, and who was reared by grandparents.

262 Relatively few items of food were available at the vil-
443 lage stores. In the inventory of the largest of the three
[27] stores in the village in 1948-49 (Sharp et al., 1953, pp. 211-
212) the following items of food were listed: big dried
chilies, shrimp paste, onion, garlic, fish sauce (fishsoy),
salted fish, fresh chilies, limes, coconut, coconut oil[1],
brown (palm) sugar, tea, coffee, condensed milk, orangeade and
lemonade (carbonated), sweets, liquor, ingredients (including
a lime paste) used together in betel chewing.[2]

New stock received in December by a local vender who kept a few items for sale at her house included mature green beans, black beans, peanuts, sweet potatoes, salted turnip, pickled garlic and tomato sauce.

272 Larger stores served as informal men's clubs where tea,
443 coffee with condensed milk, and carbonated beverages were
575 sold primarily for consumption on the premises. The proprietor
of a new store, built in December 1952, sold no liquor.

273 We have no estimate of the amount of liquor sold in Bang
[443] Chan, although for those who drank it, its caloric value might
be of significance.[3] About 9% of the householders interviewed

---

[354] [1] Listed by Sharp et al. with non-food items, as much of it was burned in lamps.

[2] Included here as food since some calcium may be obtained from this source.

[3] One observer estimated the intake of certain village men who drank regularly as at least 2 oz. of rice liquor (28-35% alcohol) per day, representing about 100 calories. The estimated intake of women who drank regularly was about 1 oz. per day.

273 in 1955 (Goldsen and Ralis, 1957, p. 57) said they drank whiskey often, 22% drank occasionally, 47% seldom, and only 22% said they never drank it.

Sale of Home Produced Foods

433 Although a majority of the families in Bang Chan made
434 most of their cash income by rice farming, sale of other home
443 produced foods, fish, and food materials such as swamp cabbage and lotus stems which grew wild in the canals was a minor but relatively steady source of income for many families. Six of the 11 families that participated in the dietary
[562] study obtained some income from sale of food[1]. The woman frequently had major responsibility for these activities. As noted by Sharp et al. (1953), a few poor families only, added to their income by selling fish.

121 In connection with this study, our concern with sale of home produced foods is primarily with the nutritional rather than the economic aspects,[2] although the two cannot be completely dissociated. Do activities of this sort on the part of some families make a greater variety of foods available to the villagers as a whole? Are some foods sold for cash which from the nutritive standpoint, might well be kept for home use? If so, is the cash thus obtained used to purchase other foods or non-food items? Is the food purchased as useful, from the nutritive standpoint, as that sold? From the standpoint of improving the nutritive value of the diet of Bang Chan families in general, would more home production of fruits, vegetables, fish and eggs by most families be feasible, or should a few families be encouraged to develop these activities on a year round basis, to increase the local supply of food other than rice? Questions of this sort must be considered by anyone attempting to improve food habits in the village.

Annual Calendar of Foods Commonly Used

221 From the records extending over the period of a year,
262 of foods used by various families participating in the dietary
122 study, and from food records provided by children in the
[123 health classes in December 1952, February, May, June, July, September, October and November 1953, and January 1954, a calendar has been constructed showing the approximate times of year at which the foods most commonly used in Bang Chan were available (Chart 2). Foods included in this chart were

---

[1] See Table 8, p. 62.

[2] See Janlekha (1955).

[Text continues on page 29 --- Analyst]

Chart 2. Annual Calendar of Fresh Foods Commonly Used in Bang Chan[1]

	No.[1] Records	May	June	July	Aug.[2]	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.[2]	Apr.[2]
Fish													
Climbing perch	114	x̲[3]	x	x		x̲	x	x	x	x	x		
Eels	27	x	x	x		x	x	x		x	x		
Field crab (salted before use)	16	x					x̲	x		x			
Oysters	22		x	x̲			x			x			
Notopterus notopterus	10	x						x	x		x		
Serpent head	99	x̲	x	x		x	x	x	x	x̲	x		
Silurus	66	x̲	x	x		x	x	x	x	x	x̲		
(1)plaa (1)thuu	163	x	x	x̲		x̲	x	x̲	x̲	x			
Other Animal Foods													
Beef	30	x				x	x	x	x̲	x	x		
Chicken	72	x	x	x̲		x̲	x	x		x			
Eggs	142	x	x	x̲	x	x̲	x	x̲	x	x̲	x̲	x	x
Frogs	18	x	x̲	x				x		x			
Pork	51	x	x	x		x	x	x	x	x	x		

1. Based on 539 records obtained from school children, and observations in 11 households on 44 survey days. Figures in the column headed No. Records indicate the number of 1-day records on which the item appeared.

2. No records were obtained from school children during March, April or August, hence absence of the item from these columns means simply that the 4 households visited in each of these months did not use the item.

3. x̲ indicates that the item appeared frequently on records obtained in this month. Note that frequency of use may be influenced by farm work and circumstances other than relative availability.

Chart 2. (continued)

	No.[1] Records	May	June	July	Aug.[2]	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.[2]	Apr.[2]
Green and Yellow Vegetables													
Basil, sweet		x	x	x	x	x	x	x	x	x	x	x	x
Chili, fresh		x	x	x	x	x	x	x	x	x	x	x	x
(3)Khii-(2)leg	10			x		x	x	x		x			
Lettuce	49	x	x	x		x	x	x		x̲	x̲		
(2)Phag (2)ka-(2)cheed[4]	138	x̲	x	x	x	x̲	x	x̲	x̲	x	x		
Pumpkin	19	x	x	x̲				x		x	x		
Snap beans	12	x	x	x	x				x	x	x	x	x
Swamp cabbage	147	x̲	x	x̲	x	x	x̲	x̲	x̲	x̲	x	x	
Sweet potato	72			x̲	x	x̲	x	x			x		
Other Vegetables													
Bamboo shoots	53	x	x̲	x̲	x	x̲	x	x	x̲				
Banana, inflorescence	25	x	x	x		x	x̲	x		x	x̲		
Calabash	31	x̲	x	x		x					x		
Cucumber	10		x	x				x			x		
Egg plants[5]	29	x	x	x	x	x	x	x	x	x	x	x	x
Garlic		x	x	x	x	x	x	x	x	x	x	x	x
Gourds, bitter	11			x	x					x			
Gourds, towel	11	x				x̲	x	x					
Lotus stalks	48	x		x		x	x	x	x				
Mushrooms	25	x̲	x̲	x		x	x̲	x̲		x			
Onions		x	x	x	x	x	x	x	x	x	x	x	x
West India pea tree flowers	39	x					x̲	x̲	x	x	x		

[4] Thai names are given when English equivalents are not known. For scientific names see Appendix C, pp. 126-127.

[5] Several varieties of egg plant were used. On many records the variety used was not indicated.

Chart 2. (continued)

	No.[1] Records	May	June	July	Aug.[2]	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.[2]	Apr.[2]
Fruits[6]													
Banana[7]	129	x	x	x	x	x	x	x	x	x	x̲	x	x
Chico	17						x̲	x					
*Guava	14						x	x		x			
*Jujube	18							x	x	x			
Longan	41			x̲									
*Limes		x	x	x		x	x	x		x			
*Mango	25		x̲								x		x
*Orange	48					x	x̲	x	x				
*Papaya	11			x		x	x	x̲		x			
*Pineapple	63	x̲	x̲	x						x	x		
Rambai	46	x̲		x								x	
Sandorica	18	x	x										
Singharanut	22						x	x	x	x			
*Star gooseberry	28	x̲				x					x		
Source of water[8]													
For drinking:													
Rain		x	x	x	x	x	x	x	x	x	x	x	x
Canal										x	x	x	x
Fishpond		x	x									x	x
For food preparation:													
Canal		x	x	x	x	x	x	x	x	x	x	x	x
Fishpond		x										x	x

6. Good sources of ascorbic acid have been marked with an asterisk.

7. Bananas of the (4)nam-(4)waa variety were most commonly used.

8. Data for households participating in the dietary study.

221 listed on 10 or more of the 24-hour dietary records obtained.
262 For items which were major ingredients, the number of records
126 on which the item appeared, is given.[1] Thus (1)plaa (1)thuu,
[128] which is bought by residents of Bang Chan during the busy
work seasons, was used more often than any other single variety of fish named. Of the varieties caught locally, climbing perch, serpenthead, and silurus were most commonly used. Fermented fish, not included in the calendar, appeared on 53 records, and fish with kind not specified, on 180. Eggs were used more often than any animal food other than fish. Among green vegetables, swamp cabbage and (2)phag (2)ka-(2)cheed were commonly used. Bamboo shoots and lotus stalks were prominent among the non-leafy vegetables. Bananas which are grown in every garden and are available all year round were much the most common fruit, although other seasonal fruits were eaten more often in 6 of the 9 months in which school children submitted records.

262 Some idea may be obtained of peak seasons for use of
126 various common foods by noting the months designed by x.
128 Thus in January and May, serpentheads were listed on about
1/3 of the records, and were frequently served at more than one meal. Sweet potato, usually fried and eaten as a snack, was listed on 35 of 52 records obtained from school children in September. Flowers of the West India pea tree were listed on 10 of 55 records in October, and 12 of 88 in November, with occasional mention on records obtained in 4 other months.

Fruits were eaten much less often than one might expect
in a tropical area where many varieties are available and
262 fruit can be grown the year round. They were most often
855 eaten by children as snacks, although pineapple and papaya
[252] were usually, and banana occasionally cooked in "with-rice"
dishes such as curry. In September, fruit was included in the diets of less than 1/3 of the children. An average of more than one serving of fruit per child per day was recorded in 5 months only, May, June, October, November and February. In May, when (4)ma-(1)faj or rambai was in season 46 of 76 children reported having eaten it. Pineapple, listed by 35 of 61 children in June, was most often served in curry at one or more of the family meals. In October, oranges were eaten by 30 of 55 children who submitted records. Bananas (mostly of the (4)naam-(4)waa variety) topped the list in November and February.

262 Items mentioned on fewer than 10 records, and hence
128 arbitrarily omitted from the chart, are worth noting as they

---

[263] 1. No figures are given for sweet basil, garlic, onions, chili or limes, which were so often used in small amounts as seasoning that the count obtained would give no clear idea of the extent of their use. Some common spice plants were not mentioned on the records.

262 might provide clues to ways in which the diet may be improved.
128 Most of these items were included in lists given by Sharp et al. (1953)[1]. To those lists should be added the following items from our food records:

Green leafy and yellow vegetables: Leaves of bergamot, chili, morinda, onion, potato, pumpkin, (2)sa-(5)noo, and of the following trees: (2)ma-(1)dan, (4)khlyb[2] and West Indian pea tree; (2)kha-(1)cauaun flowers.

Other vegetables: flowers of leek and pumpkin, and Chinese or black truffle (water chestnut).

Fruits: Thai nutmeg and tomato.

Fresh foods other than fish: buffalo, duck, cobra, turtle and field rat.

128 At the end of Chart 2, sources of water for drinking and food
312 preparation have been included, not only because water is
271 properly considered a nutrient, but also because the water used in preparation of food may affect the wholesomeness of foods eaten raw or with little cooking.

271 Untreated water was the customary beverage with meals.
[846 Ordinarily no distinction was made in source of drinking water
853] for children and adults although boiled water was given to mothers and infants to drink during the post partum rest
[758] period (Hauck, 1956). Occasionally a sick person would be given boiled water to drink; for example one man who said he was "a little sick" and "not working" was observed to drink
[274] hot boiled water from a thermos bottle. In 1955, Ralis[3] found that tea was seldom or never drunk by nearly 3/4 of the respondents. Less than 7% drank it frequently. Thus in Bang Chan no custom had grown up which would afford the general population with a measure of protection against infection from

---

[114] 1. See Sharp et al., 1953, pp. 193-196 for a list of 32
136 fish known to be found in Bang Chan; pp. 293-294 for 34 fruits
244 grown in Bang Chan, and p. 295 for 11 fruits known to be used
245 but not grown there; pp. 296-298 for 41 vegetables grown in
262] Bang Chan, and pp. 299-300 for 24 other vegetables used.

[824 2. (4)Khlyb was the term used in Bang Chan for an uni-
252] dentified tree of the family Leguminosae. Its sweet tasting leaves were washed in boiling water to get rid of a bad odor, then were eaten with (4)nam (4)phrig, a chili sauce.

[114 3. Golden and Ralis, 1957, p. 57. The answers to:
126 "Do you drink tea frequently, occasionally, seldom or never?"
272] were: often, 22; occasionally, 68; seldom, 158; never, 85.

271 contaminated drinking water, but the traditional use of boiled water for newborn infants and their mothers, and its occasional use for sick persons, might provide the starting point for a desirable change.

Meal Preparation and Service

Processes and Equipment

252 The principal processes involved in food preparation for which equipment was required are: cutting solid food into bite-size pieces, pounding spices and flavoring materials, grating coconut, straining, boiling, sauteing in a small amount of fat, steaming, and roasting on a stick or metal support over the fire. Although foods were steamed or roasted only occasionally, the processes were familiar to all.

358 The Thai kitchen had no oven. When the term "baked" was used, it might mean cooking with dry heat on a rack over the fire (as banana baked in the skin) or without fat in the frying pan (as small dried fish toasted in this way).

128
415 Equipment used during meal preparation by the 11 families observed on 44 survey days is listed in Appendix A, p. 96, that used in serving and eating food, on p. 96.

252
415
554
184 The type of food preparation and service was much the same in the relatively well-to-do and the poorer households in Bang Chan. The chief difference in equipment for food preparation and service in families of different economic status was in the number of items of one kind which were owned. Thus a poor family might own one knife and one clay water jar, whereas an affluent family would probably own several knives and a number of water jars. Equipment used on special occasions, as in preparation of food for large numbers of people, was owned by well-to-do families only. Some had enough equipment for large cooperative work parties.

Persons Responsible for Food Preparation

252
462 Food was usually prepared by the homemaker and/or older daughter, if one were at home, but all members of the family who were old enough to help, had some knowledge of food preparation and did prepare food as the occasion demanded. While preparing, cooking and serving food were more frequently carried out by women than by men, adults and school-age children of both sexes had some competence in this area. "While certain activities are normally assigned to men and others to women, the Thai maintain no rigid compartmentalization and are unembarrassed when a woman does a man's job or a man does

252 a woman's" (Sharp et al., 1953, p. 88). For instance, the
462 husband cooked when his wife was away from home, e.g. selling in the market or in farm labor, and of course when she was
252 sick or resting after childbirth. The ability of boys as well
867 as girls to cook rice and some of the accompaniments was taken for granted. A girl or boy could cook rice "as soon as he could lift the rice pot," e.g. at 6 or so; by age 12 he could cook a creditable meal. In mid-December, 1952, on the last day of school before vacation, one of us saw committees of school children (aged 7-14 years) preparing food for a special meal, on the school grounds. The variety of dishes prepared and the ease with which the children went about their tasks gave evidence of the home experience these children had had
252 (Hauck, 1953). Responsibility for food preparation increased
[589] with age up to about 15 years, after which all available able-bodied family members did field work during the busy seasons (cf. p. 11). Several hours per day were spent in cooking and by middle age, parents were eager to turn this job over to a
[597] daughter or daughter-in-law. If they had no daughter, this was an explicit reason for adopting a baby girl.

252 Certain men of eminence, e.g. headmen and elders, would
554 not be asked to cook at all, but as they aged, they might re-
887 turn to the task. One old headman, all of whose children had married and left home, said that he was doing the cooking for
252 2 months because his wife had back trouble. Some dishes were
562 cooked by men only, even when their wives stood by: turtle, frog and cobra curries, for instance. These were also food for men only, suitable to serve at a drinking party.

252 A premium was put on good cooking, and certain women
261 who were noted for their cooking were in great demand for large
[868] scale food preparation during the ceremonial season. One farmer planned to send his daughter to learn from such a skilled cook, having in mind the food preparation which would be needed when his sons were old enough to be ordained. Adverse comments might be made if the food did not come up to expectation; thus, a small boy complained that his curry was "too salty," and an old woman said loudly that the curry made by her 16-year old grand-daughter was "not good," although this girl was the only one at home to cook.

Meal Patterns[1] and Preparation of Typical Thai Dishes

252 Food was commonly prepared twice a day, in the morning
264 and late afternoon. The meal pattern was the same for breakfast

---

114 [1] Suvarnakich (1950) described the Thai diet in a
262 general way and Sharp et al., (1953, pp. 263-274) summarized the small amount of information on diet in Bang Chan obtained during the preliminary study in 1948-49.

252 and dinner, either meal taking an hour or two to prepare.
264 Snacks might be eaten at any time. Adults often ate just the
two principal meals, but children, especially the small ones
who were not in school, might eat whenever hungry. The
school children often purchased snacks from venders on the
252 school grounds. If food was to be offered to the priests,
[253] who went around the village about seven o'clock in the morn-
ing, breakfast preparation was begun early, between 4:30 and
5:30 a.m., although family members might eat at various times
during the morning: the husband before he went to the field,
older children, before school time, babies and small chil-
dren when the mother had time to feed them, and so on (Appen-
dix A, p. 95). Preparation of supper usually took place
sometime between 2:30 and 6 p.m. Whenever possible, family
members ate together at the evening meal, but many exceptions
were noted.

252 262 Rice is the principal item in every Thai meal. In Thai the general term meaning "to eat" is translated literally "to eat rice." All food items are divided into two classes: rice and "with rice," or (2)kab (3)khaaw. Among the families studied three or four "with-rice" dishes were usually prepared during the day, i.e. for the two main meals, but the number varied in different families, and according to season. One or two of these dishes would usually be "hot" i.e. highly seasoned with fresh or dried chili peppers. Fish was the food item second in importance to rice, but the typical "with rice" preparation, whether hot or mild, contained more than one food item in addition to a variety of spices and flavoring materials (Appendix C, p. 118).

262 264 Between meal snacks might be any available leftover food,[1] fruit, or items purchased from a vender.[2] Such snacks were not regarded as meals, however, as no Thai considers that he has eaten a meal unless he has eaten liberally of rice.

252 The general method of cooking rice was the same throughout the village. The rice was washed two times in water from the canal or fish pond, and was then boiled in a large volume of unsalted water for about 24 minutes. The rice pot was

---

[1] Leftover foods from breakfast were eaten later that day with or without reheating. "With-rice" was seldom left over from the evening meal, but rice was frequently kept over night.

[252] [2] Deep fat frying of bananas, sweet potato slices and the like was commonly observed, both among venders who sold their wares on the school ground, and those who travelled by boat. This method of cooking was never observed in ordinary home food preparation probably because fat was in relatively short supply.

252 usually covered. A common practice was to remove the cover
and stir the rice once, toward the end of the cooking process.
When the rice was almost done, surplus cooking water was
drained off, and often after a lapse of time, the covered pot
was put back onto the fire which had been allowed to die down,
for about 6 minutes.[1] Thus the final cooking was essentially
a process of steaming. Total cooking time varied from a little
over 20 minutes to three-quarters of an hour, depending primarily
on the amount of rice cooked. The finished product was
moist enough to form a ball when pressed between the fingers.
Left-over rice, if not eaten cold as a snack, was reheated by
[231] being added to the hot rice at the next meal. Rice water was
commonly given to pets if there were any. In 4 families which
[272] participated in the dietary study, rice water was given to in-
[855] fants, one 11-year old boy served himself liberally to it, and
one adult man was observed to drink rice water before meals.

The many recipes for preparation of "with-rice" dishes may be grouped into two categories, hot and mild. Hot dishes always contain chili and varieties of spices which are hot tasting. One type of hot dish is curry which may be designated as either "hot" or "sour". Thai curry consists chiefly of fish or any available kind of meat, with or without vegetables. To make curry, shrimp paste, chili and spices were pounded thoroughly and then mixed with the meat and condiments and frequently with coconut milk. All were boiled together. Vegetables, if used, were added when the mixture was nearly done. Both vegetables and meat were cut into small pieces and washed before cooking. With the exception of dried chilies and tamarind, foods were not ordinarily left to soak in water. Sour curry differs from hot curry in that it contains less chili and spices and has a mixture of tamarind ((4)ma-(1)dan might be substituted) crushed with water added to it.

The other type of hot dish is (4)nam (3)phrig or chili sauce. It is made of shrimp paste, chili, garlic and other spices ground together in the mortar and then mixed with lime juice, sugar and salt or fishsoy. (4)Nam (3)phrig was always served with either raw or cooked vegetables. One informant commented that (4)nam (3)phrig was the everyday food among the villagers.

Preparation of mild dishes varied. These included panned vegetables, meat or eggs cooked with small amount of fat and a variety of spices and condiments including black pepper but not chili. Fish were sometimes roasted or boiled. Vegetables might be eaten either raw or cooked in coconut milk without seasoning. If vegetables were simply boiled in water,

---

[1] Median times for a series. In 15 instances cooking time before draining ranged from 18 to 38 minutes and rice was steamed from 2 to 12 minutes after draining.

252 cooking water was discarded. In Bang Chan, foods were not usually cooked a long time.

In most village homes, one fire only was built for ordinary meal preparation. Rice was cooked first, then "with-rice" dishes, no attempt being made to serve the rice and accompanying foods hot. Indeed, with the frequent use of chilies, one might have the sensation of eating hot foods, no matter when they were taken from the fire. Notes on the preparation of a meal in one household that participated in the dietary study, are included in Appendix C, p. 119.

Meal Service and Techniques of Eating

264 Food was generally served in the kitchen area. When possible, family members ate together at the evening meal, sitting on the floor, each one old enough to feed himself having a bowl of rice before him. The "with-rice" dishes were placed in the center of the group. Family members helped themselves to portions of the "with-rice," using the right hand to take solid foods, and a serving spoon for fluid foods. Enough rice for a bite was pressed together with the fingers of the right hand, so that grains would not be scattered as the rice was conveyed to the mouth. "With-rice" of semi-fluid consistency was eaten by dipping the ball of rice into it, or more exactly, touching one side of the ball of rice to it. The amount of "with-rice" was generally small, and to take more than one spoonful onto the plate at a time would appear greedy.

264
593 When families did not sit down to eat together, those who ate first were expected to take no more than their share. The wife saw to it that her husband had a liberal serving of the best food available. She also gave generously to the children, holding back, eating last or what was left, herself. In a well-to-do household, where food was ample, the mother would be as well fed as others; in a poor household she might be short-rationed day after day.

When priorities in serving were observed,[1] young children, "not old enough to know better" were not expected to wait until the elders had been served. A frequent pattern at both breakfast and dinner was for older children to feed the younger ones before their own meal; elders in the family then ate, and husband and wife ate together if possible, or as
[illegible] convenient to their separate schedules. In the morning if food was to be offered to priests, family members did not ordinarily eat until after the priests had been served. If necessary, however, the priests' food could be served onto a
600 tray, then others might eat. The observer often had

---

[1] See footnote 1, p. 49.

The observer often had
186 opportunity to make notes on foods eaten by various family
262 members. Two examples of these are included in Appendix A,
p. 97.

Snacks

262 We have noted that various family members ate the morning
264 meal, in particular, at different times, and that children
[855 especially might eat leftover food between meals. Most Bang
Chan school children[1] ate snacks, which were usually different
[443 from foods eaten at a regular meal. Doubtless most of them
were purchased from one of the venders who were to be seen on
the school grounds daily. Fruits and "desserts" were most
commonly eaten, although a variety of other foods, not a part
of the usual Thai meal, were also listed. Sweets were listed
about 450 times on the 539 records obtained. Many of them had
a base of rice, rice flour or glutinous rice with sugar, and
included coconut, banana or other fruit. Some were made with
legumes, and a few contained egg. Fried bananas, fried sweet
potato slices, bananas or beans cooked in syrup, and bananas
cooked in sweetened coconut milk were also listed. A few
items such as ices, flavored syrup poured over shaved ice, and
candies, had little nutrient value other than caloric content.

272 A glass of milk, and milk with coffee, were each listed
once. These might have been obtained at the store adjoining
[854] the school grounds. These instances are worth noting primarily
because, although dried and tinned milks were obtainable,
milk was seldom given to village children after weaning.

262 Many children were given a bit of cash each day, and
437 Janlekha (1955) commented that some children who did not have
855 any might barter an egg for snacks. One could tell fairly
[261] well from the children's records what the venders offered for
sale on a given day. Some influence of season was apparent;
thus ices and syrup over shaved ice were eaten more often during
the hot dry season, and cooked foods such as fried Chinese
noodles appeared primarily in the cool season.

---

[128] 1. With the cooperation of teachers of the third and fourth grades in the Bang Chan elementary school, records of food eaten during 24-hour periods were obtained from children in these grades at intervals of about one month during the school year. This was a regular activity in the health class. A total of 539 records (from 1 to 8 for each child) were obtained from 75 boys and 72 girls. To facilitate recording, each child was given a sheet of paper, with spaces for his name, the date, and kinds of food other than rice, eaten at the morning, noon and evening meals, and as snacks. These records were collected primarily for information on meal patterns of village families for comparison with the limited sample in the dietary survey, and on seasonal use of various foods.

262 Some snacks, i.e. seasonal fruits, may have been picked from the home garden, and items such as lotus seeds were probably gathered wherever the children found them.

Comments on Foods Eaten by School Children

126 In addition to the high percentage of school children
264 who ate snacks, a conspicuous observation was that many ate
855 no regular lunch (Table 3). We did not ask the children to record when they ate snacks, but only what they ate. The number of snacks recorded by individual children did not, however, appear to be related to whether or not they had eaten lunch. For example, among the 76 children who provided 24-hour food records during May, 1953, the average number of snacks recorded by the 39 children who ate a regular lunch and the 37 who did not, was about the same, i.e. a little over three per child.

Table 3. Number and Percentage of Children Who Ate Snacks, and Who Missed Lunch, Arranged by Months in Which Records Were Obtained

Month[1]		No. of Records	Children who ate snacks		Children who missed lunch	
			No.	Percentage	No.	Percentage
May	1953	76	73	96	37	49
June	1954	61	56	92	32	53
July	1953	79	77	98	53	67
Sept.	1953	52	49	94	36	69
Oct.	1953	55	50	91	22	40
Nov.	1953	88	81	92	57	65
Dec.	1952	18	14	78	10	56
Jan.	1954	69	64	93	41	59
Feb.	1953	41	39	95	33	81
	Total	539	503	93%	321	60%

[1] Note that although the figures are arranged by month, the records were obtained over a period extending from December 1952 through June 1954.

264 855 [262] Most of the children who ate lunch regularly brought rice and some of the "with-rice" dishes prepared for a family meal in a lunch pail. Menus for breakfast and noon meals were often identical. Children who lived at a distance may have found it harder to carry lunch, especially when they had to walk to school, but the month by month record of the percentage of children who missed lunch (Table 3) does not indicate any clear seasonal trend. Even children who lived nearby might neither bring lunch nor return home during the noon recess. We were at the home of a school teacher, a short distance on foot from the school, when his two children returned in the afternoon. The mother said that they usually waited until after school to eat, but were having no snack on that day because for the first time, they had carried lunch to school.

Thorangkul (1957) scanned all of the dietary records to 126 262 note the frequency with which the following food groups occurred: protein-rich food, carbohydrate-rich food other than plain boiled rice, vegetables and fruits. She considered the records of each child as a unit; thus if a boy for whom 5 daily records were available, had recorded protein-rich food such as fish, eggs, or beans 16 times, he was regarded as having more than 3 "servings"[1] of such food per day. The frequency with which various food items occurred in the daily diets of these children is shown in Table 4.

Considering the day's record as a whole, some protein-rich food, usually fish, was included in the records of 97% of the children. Such protein-rich food appeared two or more times per day in the records of over 80% of the boys and about 90% of the girls. In contrast, no fruit was mentioned in the records of about 10% of the children, although fruit was one of the commonest snacks. Vegetables were not mentioned in the records of 10% of the boys and 3% of the girls. Only about one-fourth of the vegetables recorded were green or yellow.

For 75 children for whom we had 4 or more records, Thorangkul (1957), to obtain a rough estimate of the adequacy of the children's diets, grouped the records into three categories, based on the number of times protein-rich foods, vegetables and fruits appeared. On the average, children whose diets were placed in Class I had at least 3 "servings" of protein-rich food, 3 "servings" of vegetables and 2 of fruits. Diets in Class II included some from each of the food groups each day, but the items were recorded less frequently than in diets in Class I. Diets in Class III did not include foods from each of the food groups emphasized, each day. On this

---

[104] [1] The term serving is used here to designate each time an item appeared in the daily food record. Thai do not have "servings" as the term is used in Western countries.

126
262 Table 4. Frequency of Occurrence of Various Food Groups in the Daily Diet of 147 School Children in Bang Chan

(Adapted from Thorangkul, 1957)

Number of servings[1]	Protein-rich food	Carbohydrate-rich food[2]	Vegetables	Fruit
	Percentage, based on records of 75 boys[3]			
3 or more	47	8	28	8
2 to 2.9	36	15	23	18
1 to 1.9	13	40	30	37
0.1 to 0.9	3	37	9	26
None	1	-	10	11
	Percentage, based on records of 72 girls[3]			
3 or more	68	13	21	10
2 to 2.9	21	17	38	27
1 to 1.9	4	22	34	38
0.1 to 0.9	3	48	4	15
None	4	-	3	10

[1] The term serving is used here to designate each time an item appeared in the daily food record.

[2] Other than plain boiled rice, which is an essential part of every Thai meal.

[3] Average frequency of occurrence was computed, considering the records of each child as a unit.

basis, nearly a third of the children who provided diet
records had diets which were classed as III (Table 5). Al-
126 most all of the girls and about 4/5 of the boys in this group
262 missed lunch. Indeed the common habit of eating just two
264 main meals, with snacks, was probably one important deter-
minant of the number of servings of protein-rich foods and

Table 5. Diet Classifications for 75 School Children in
126 Bang Chan, and Percentage of Children with
264 Each Diet Classification who Missed Lunch

(Adapted from Thorangkul, 1957)

Diet classification[1]	Percentage of children	Percentage of children who missed lunch	
Class I	8	Boys	46
		Girls	45
Class II	61	Boys	73
		Girls	68
Class III	31	Boys	81
		Girls	98

[1] See text for basis of classification.

264 vegetables eaten, since items from these two food groups were
126 not commonly eaten as snacks. Note, in the illustrative
262 records presented in translation (Appendix A, p. 98). that the child whose diet was considered to be in Class III did not eat a regular lunch on any of the six days for which records were available, whereas the child whose diet was classified as I ate a regular lunch six times out of seven.

Family Food Shared With Others

264
476 Throughout the year families prepared especially good meals for persons who came to work cooperatively with them. Every rice-grower entertained his cooperative harvest crew,
[466] some the transplanters. Hired laborers were not usually served such feasts, but the conviviality of the harvest season called
[435] for a round of liquor even for them. One harvest dinner for 48 cost 50 baht, plus eels (60 baht) and rice. Cooperative
[256] home pounding of rice was still practiced in some households and thought to be fun. In one day enough rice to produce 40
[433] tang (640 kg.) was pounded by groups of 15 to 20 workers; in an evening 20 tang were done. If 40 tang were milled, workers were served a full meal; if 20 tang, a dessert only. Other occasions were fish-pond draining, house raising and repair.
[262] Each participant in the fish-pond draining at Household 21 was fed (3)khaaw (3)tom (soupy rice) for lunch and "an enormous supper," in addition to receiving the traditional pot of fish. If good food were not served at these functions people

264 would not come willingly to work. When a family with a repu-
476 tation for stinginess diluted the (3)khaaw (3)tom too much,
[574] the group refused to eat any, thereby reminding the host of
his obligation for hospitality.

574 Guests to whom meals were served fell into four cate-
gories: 1) kin, 2) visiting dignitaries, 3) priests and 4)
drinking companions. Kinfolk who came as guests were married
children, or those who were away at school or work, or kins-
men from Bangkok or elsewhere. The older the relative or the
greater the distance travelled, the greater the honor accorded
him. Foods were exchanged. Two visiting ladies travelling
in a large boat, made an annual round of all their relatives,
bringing certain "city" foods and receiving substantial gifts
of rice, fish and fruit. They stayed for several days as
guests of one family, then moved on. Every person from Bang
[430] Chan who visited a relative in Bangkok carried big packages
of food, usually rice or eggs, as gifts. With the inflated
prices in Bangkok, it was advantageous to have a "country
cousin" who might bring food. Visiting kinsmen always recog-
nized the need for eventual reciprocity.

Visiting dignitaries were usually entertained by hamlet headmen. Meals served to visiting officials, policemen and others might be elaborate, involving cooperative help in preparation, but reciprocity, if any, rarely took the form of a return meal.

[792] Regular visits of the priests, as well as the invitation of priests to the house for special events, have been mentioned. Priests might also come from afar, usually staying at the temple but receiving generous offerings of food from people of the community.

[562] The custom of convivial get-togethers of either or both
sexes was well established. Men traditionally enjoyed "stag"
dinners of four up to twenty or more whenever the ingredients
for a turtle, frog, cobra or other snake curry were available.
Chicken curry might also be thus served, and once a catfish
mash was prepared by a male visitor from the north. Those
curries were cooked by men, and the host served liquor freely.
[784] The all-male character of the occasion reflected the old re-
[788] strictions on women's partaking of flesh foods (see p. 42),
[273] but older women did not hesitate to join in the drinking.
[524] Women also got together in drinking parties, sometimes to
play cards.

In addition to sharing food with people in these four categories, the general rules of hospitality required that anyone who came to the house at meal time, should be offered food, or at least a drink of liquor, tea, or plain water.

Attitudes Toward Food

262 To older Bang Chan residents, to lack rice was to starve
[261] even though fish or vegetable fare were at hand. Since rice
262 was the staff of life, many important customs clustered about
243 it. Ceremonies to the Rice Goddess accompanied the raising,
[187] rolling, and storing of rice. When the unhusked rice was in
the bin, it could not be withdrawn at any time as needed, but
astrological charts had to be consulted to make sure the day
[186] was auspicious. Paddy could never be withdrawn on Friday, a
day sacred to the Rice Goddess. After cooking, the best rice
was said to be at the mouth of the pot, so this was offered
on ceremonial occasions. Important rules were that when cooking
rice, the cover of the pot must never be laid in a mortar
and it must be inverted, never laid down flat; otherwise one
would be short of rice. One must never scrape the top of the
rice with the cover, or the "soul" of the rice would be scraped
[184] out of the pot. Moslem residents murmured an Arabic prayer
[565] every time the rice was put into the pot, and every time the
pot was put onto the fire, as well as before eating.

261 Rice has been generally regarded as the strength-giving
262 food par excellence. A portion of Chutima's (1939) description
of the "old system" follows:

> Our children and young women are forbidden by ancient doctrine from eating any fair quantity of animal products, but must eat plenty of rice which is considered as the only true food, the others being only appetizers. And to stimulate the palate, large quantities of hot and irritating condiments (chilies and peppers principally) are consumed at every meal. Some vegetables, boiled or raw, are also included, but in small quantities in spite of abundant supply.

The quotation indicates first that in the past, rice was considered much more important as food than the "with-rice"
[657] dishes. Since the Food and Drug Division of the Ministry of
Public Health has been attempting to encourage the eating of
more "with-rice," the attitudes found in Bang Chan are of interest. One informant stated that only rice can make children fat, and that the "hot taste" foods help them to eat more rice. Another commented that rice makes children strong, and "with-rice" makes them weak. Another, a mother of seven children, said that if babies were given too much "with-rice" they would be potbellied. The more modern view was expressed by an informant who said that a certain child ate only rice with fish, and was weak; he refused vegetables and banana. One affluent farmer, an elderly man whose orphaned grandchild was being raised on cow's milk (evaporated or dried milk, diluted with boiled water) expressed the opinion that the ancient belief was based on thrift. He said that thrifty

262 people did not want to spend much on a baby, therefore they 261 said that if a child ate too much "with-rice" he would be potbellied but thin in the upper part of the body, and that eating eggs would cause dental caries. This grandfather said he believed the truth to be just the opposite, but that goods things were expensive. As an illustration of the idea that thrift was the basis of restriction of "with-rice," one young mother said that an egg was regarded as equivalent to one (1)plaa (1)thuu (fish), and was enough for two persons. Sometimes one egg would serve an entire family. She said that a child would be punished if he ate a whole egg at a meal.

262 Secondly, Chutima suggests that particular foods were associated with, or suitable for, particular age levels, and a given sex. Data obtained in Bang Chan indicate that certain foods were associated with conditions such as pregnancy, lactation, and the puerperium, with occupation, and even 553 socio-economic levels. For infants, breast milk was considered most suitable. The newborn infant was not usually put to the mother's breast for about 3 days after birth, and if a relative or neighbor did not nurse the infant, the small banana called (3)kluaj (4)nam-(4)waa (see p. 46), raw or baked, was crushed and fed to him before his mother's milk was available. This banana and rice, as (3)khaaw (3)tom and (3)khaaw (2)piag (two watery preparations), sometimes crushed with (3)kluaj (4)nam-(4)waa, were always the first solid foods introduced while the infant was breast fed. No other foods were introduced early. Some infants received fish and egg by 6 months of age, and a majority ate these foods by the time they were a year old. Some two year olds had not yet been given vegetables, and very few infants ate them before they were one year old.

855 Giving of "holy food"[1] to children suggests concern for [778] strengthening children through dietary as well as other ritual means.

262 At the other end of life, as old age approached, the 888 diet was supposed to change, ideally to a completely vegetarian one. Since one was soon to face death, one gave up eating meat and even fish, if possible, so as to avoid taking life. It was considered pitiful or wrong for an old person to fish. Being able to go without food was associated with merit. Those who stayed overnight at the temple on the Buddhist holy day went without solid food from before noon until the next morning as the priests did. One elderly woman remarked that when she stayed overnight at the temple she did not feel hungry, and did not eat anything at night, but other women, feeling hungry, drank coffee or milk at night. She

---

[1] See p. 50.

262 understood that her merit helped her not to be hungry. Once
888 she asked an eminent layman about eating at night. He said, "If you are not hungry, do not eat. If you feel hungry, it is better to eat. If someone invites you to eat, it is sinful to refuse."

261 Even young adults had a strong revulsion against gluttony. One of the symptoms of a man who went mad and had to be committed to an institution was that "he ate too much." A woman was despised because "she ate in secret. She stole eggs from her husband, sold them in the market, and then spent the cash on food which she ate there, instead of bringing it home." Definitions of a glutton were, "A 'with-rice' eater," or simply as "one who eats alone." These comments highlight the counsels of eating in moderation and in company. On the other hand, a full stomach was valued for "home is where one eats one's fill."

262 At maturity, when farm and other tasks were shared as
562 equals, men and women ate almost the same food. The old proscription against animal food for women was somewhat relaxed,
262 but not entirely. To sustain farmers during the seasons of
[220] hard work, however, extra quantities of rice and rice alone, were considered essential. "With-rice" was pleasant but not so necessary. Any shift away from a diet of rice as ordinarily cooked in Bang Chan[1] was construed as a shift either in occupation or in health. For example an eminent citizen who gave
[853] up farming took to eating (3)khaaw (3)tom often. This soupy rice, a staple dish for infant feeding, had interesting socioeconomic connotations. It was served as a light lunch to cooperative farm-workers to be followed at the day's end by a real meal. It was also "delicate" food, suitable for the sick, for city-people, for those who did not toil with their hands and backs. Consequently, when this man ate this "delicate food" more often, he was consciously or unconsciously serving notice on the community that he was not going to do farm work any more, for (3)khaaw (3)tom could not possibly have sustained a farmer's strength. Caustic villagers hinted that he was putting on airs.

262 Among conditions in which some change from the usual
843 diet was found were pregnancy, post parturition and lactation.
846 Relatively few foods were generally considered to be tabooed under any of these conditions, but many women preferred to limit intake to "safe" foods if there were any possibility that certain foods might cause harm.

[126] Information was obtained from 42 mothers about the food they ate during the post-partum rest period. Two said they ate as usual, but for the remainder, the diet was considerably

---

[192] 1. Literally "beautiful rice." For method of cooking, see p. 33.

262 curtailed. About half ate soupy rice rather than rice as
843 usually prepared. All ate fish, but over half ate salted
846 fish only, and about one-fourth ate fresh fish only. Rice and fish were apparently the only foods considered safe by all of these mothers. The only other food eaten by half or more of them was banana of the (4)nam-(4)waa variety, baked bananas being commonly specified. Vegetables, when they were eaten, were usually in (1)kaeaeng (1)liang, a broth made with dried fish, and reputed to be valuable for milk stimulation. In Bang Chan, the inflorescence of banana was commonly used in making this product, but other vegetables were favored by some. When asked what foods they considered good for a woman who had recently borne a child, no mother knew of any such food, but the list of foods mentioned as being bad for the mother during the post-partum rest period included more than a dozen items mentioned from 1 to 4 times each: egg, sweets, beef, vegetables, meat, pork, poultry, fresh fish, sour tasting foods, jackfruit, mangoes, fruits of all kinds, and glutinous rice.

262 Fear of illness from eating incompatible foods after
846 child birth was rather strongly expressed by many informants,
153 even by some who knew of Chinese customs which were different
829 from the ancient Thai customs. Some also knew that foods which were customarily forbidden to the woman who had her child at home in the village, were not forbidden at the government health and maternity center at Minburi.

126 The 45 mothers who were interviewed during lactation,
262 but after work had been resumed, ate more nearly the usual
846 diet than was the case during the post-partum rest period. As in pregnancy, the mothers apparently had no notion of special dietary needs during lactation, but foods considered undesirable during lactation were mentioned 27 times. The list included 12 kinds of food, and four attributes of food, i.e. sour and hot tastes, fermented foods and raw foods. No food was considered harmful by a majority of mothers, the one which occurred most frequently, jackfruit, being mentioned by 8 only of the 45 informants.

262 Reasons were seldom advanced for considering various
753 foods unsuitable for mothers or children. During pregnancy,
853 the hot-tasting foods, i.e. those made with chili, were said by one informant to injure the baby's complexion. When asked at what age a child could have adult food, mothers might say at one or two years, but often specified without giving a reason, that the child could have anything but the hot-tasting foods. A reason given for omitting jackfruit from the diet during lactation was that it would cause diarrhea in the baby. One informant said that if a mother nursing a young baby, 1 or 2 months old, ate fresh vegetables, the baby would have diarrhea. Some informants said the "fragrant banana"[1] caused

---

[1] The type of banana most familiar to people in the United States.

262 constipation in infants, others that it caused diarrhea, whether
753 eaten directly by the infant or by the mother.
853

The belief that eggs would cause dental caries, and should therefore be omitted from children's diets, was expressed by the mother in a poorly nourished family. The possibility that such ideas arose from unwillingness to spend much money on food for a child has already been noted (see p. 42).

262 Information on food suitable in illness was obtained
753 only incidentally. The Thai did not appear to have a consis-
758 tent theory as to the cause of disease (Sharp et al. 1956, p. 489), and residents of Bang Chan did not seem to associate any of their illnesses with contaminated food or water. Choice of food in illness was probably associated in some instances with the idea that the body is composed of the four elements: wind, water, fire and earth, and that sickness results from or is a symptom of imbalance in the proportions or arrangement of these elements. Thus the "fragrant banana" and eggs, because of their "cooling effect," were said to be forbidden in measles. A child who was getting measles was re-
[853] stricted to rice and dried fish. In contrast the small, rather flavorless banana, designated (3)kluaj (4)nam-(4)waa, was said to have "no cooling effect" and was considered an acceptable food in illness, as well as for newborn infants.

262 In one instance, when a patient had been taken to the
758 hospital with severe diarrhea, a nurse instructed other family
784 members not to eat ices, syrup (see p. 36), or raw vegetables, nor to drink unboiled water. The informant who told us about this offered no reason for these precautions. These foods were simply "forbidden" to the family of a patient with severe diarrhea.

777 Notions as to what is fortunate or unfortunate may also
824 affect agricultural processes. The many ceremonies associated
245 with culture and use of rice have been mentioned (p. 42). The idea that a papaya tree growing near the house was "unlucky" was attributed to Thai by a young Thai Moslem in Bang Chan. When we commented on the papaya tree near his front door, he said the papaya tree dies easily and does not like water, but his was planted on high ground. According to this informant few villagers would be willing to grow papaya trees near the house. He considered the non-specific threat of harm as unreasonable, though he said that if specific harm were said to
[777] result, he would be concerned about it. The midwife at Minburi Health Center said that she urged each woman who came there for delivery to have more banana, mango and papaya trees planted for home use. Before raising of papayas can be successfully encouraged, however, the idea that papaya trees bring back luck must be overcome.

FOOD IN CONNECTION WITH FESTIVITIES AND CEREMONIES

262 A discussion of food habits in Bang Chan would be in-
796 complete without some description of ceremonies ((l)ngaan)[1] which dominate the village scene during the dry, post-harvest season. These events are of interest in connection with food habits because of 1) the prominent place that food occupies in them, 2) the cultural significance and relatively large cost, both of which must be taken into account in any plans for dietary improvement and 3) the possible influence of differences in food habits at the ceremonial season and of problems of sanitation incident to large-scale food preparation on the nutrition and health of village residents.

796 The season for ceremonies and festivities opened with the harvest rites to the Rice Goddess and closed with the beginning of Buddhist Lent in mid-July. The big occasions were cremations, ordinations into the Buddhist priesthood, weddings, and rites for cutting of the topknot[2] or homage-to-the-
527 teacher.[3] Smaller family celebrations might mark such events as the raising and dedicating of a house, the return of a son from the army, or even public events such as the completion
264 of a road or a bridge. Whatever the focal activity, a gala meal was served first to priests and then to guests.

[782] Offering food to priests brought merit, which ensured happiness in later rebirths (see p. 9). Because the greater the number of priests served, the greater the merit, people were spurred to put on as large an affair as they could
[554] afford. Moreover, a person was judged throughout the community by the abundance and quality of the food served daily and at festivities. Thus, there was reason to make a (l)ngaan
527
796 as opulent as possible, but celebrations of every degree occurred in Bang Chan, from lavish feasts to simple ceremonies.

---

[796]
[461] [1] Significantly the same Thai word is used for work and for ceremony.

[302]
[881]
[855] [2] Topknots, formerly worn by all Thai children, used to be cut ritually at the time of puberty. In Bang Chan, the growing of a topknot had become primarily an attempt to improve a child's health. Few school age children wore topknots. They were usually cut earlier than puberty.

[575] [3] A person who had received specialized knowledge from a teacher gave thanks annually in a ceremony, to which those who had profited by this knowledge were obliged to come and/or contribute. Thus, all the patients of a traditional medical practitioner helped him to honor his teacher.

796 The actual ritual of these ceremonies did not take a
great deal of time although it was important. Most of the
[476] time and effort went into preparing and serving food. Even a
small celebration involved cooperative effort among relatives
[782] and friends. For every event, the Buddhist altar in the home
was decorated and offerings were made to the house-spirit. A
764 big cremation might require planning in detail for years ahead:
796 invitations to priests and relatives in distant parts of the
574 country; hiring an orchestra and obtaining ceremonial gear.
[533] For the largest events, when the guest lists ranged upward to
60 or so priests and 400 other guests, one borrowed the
[426] hundreds of trays, dishes and bowls owned by the temple. No
rental fee was charged for these, but such items had to be returned the next day, clean, and damaged articles replaced or paid for. As the day or days drew near, boat-loads of fresh provender were bought at big markets, and organized cooperative cooking went on under the direction of a competent person,
[258] usually one of the "professional" cooks of the village. The
[476] day before one ordination, 33 women were seen preparing vegetables, fish and soup; 13 others were making 7 kinds of desserts; about 50 others of both sexes were at different tasks, the men in particular cooking Chinese noodles, grating coconut, stirring, stoking fires. The picture was one of rows of stoves, pots so large they were stirred with a boat paddle, buckets of sugar, eggs by the hundreds, a hired generator to run a mechanical coconut-grater. On this occasion two meals were served. At another splendid (1)ngaan, the priests were fed three meals, other guests up to eight meals, over a period of two and one-half days. Workers had received additional meals beforehand.

[262] The banquet comprised rice and many dishes not met with in daily fare: Chinese noodles; "with-rice" dishes of several kinds, rich in fish, meat and vegetables: for example, fried chicken with internal organs, garlic and pepper; fried pork with mung bean; (2)mii (a fried vermicelli) with fish, vegetables, and a tomato sauce; many different desserts made of eggs, rice flour, glutinous rice, agar, coconut and coconut milk, sugar, sweet potato, dried green beans; flowers served in syrup, fresh fruit such as watermelon; ices and coffee.

128 In Appendix A, p. 102 is a list of foods bought for an
262 annual homage-to-the-teacher rite. It is the nearest approxi-
796 mation to a quantitative record of food for a ceremony that
the research group obtained. The prominence of purchased
815 foods, especially of flesh foods, is noteworthy.

264 On the great day, the priests were served first, either
796 at 7 a.m. or 11 a.m., or both, always at least in part by the
792 host, who sat and chatted with them. No one else ate until

264
735
792 the priests had finished[1]. The trays of food from which each
[264] guest served himself were bountiful, but it was not proper to
796 eat very heartily, lest the host suffer the shame of running
[541] out of food. If there were a dramatic show or movie at night
it was open to the public. In one case 2000 people attended.
[443] At that time eight commercial venders turned up to sell
coffee, soft drinks, ices and other foods. Venders came to
every large ceremony, and were heavily patronized. At the
end of a (1)ngaan, the sponsors felt satisfaction and security.
Where there was plenty of food to take home, the success
was even greater. An earthy compliment was, "the fields were
full of feces."

262 In addition to the banquet were ceremonial offerings of
796 food to spirits and ritual food sometimes consumed as a
[782] sacrament. For each ceremony, appropriate selections were
made from a specific list: a cooked pig's head, or at least
a slice of cooked pork; two kinds of sweetmeats, red ((2)kha-
(5)nom (3)tom (1)deeaeng) and white ((2)kha-(5)nom (3)tom
(5)khaaw); a cooked fish, usually (1)plaa (3)chaueun, with
its head and tail; a green coconut with its coconut water; a
bunch of bananas either of the (3)kluaj (4)nam-(4)waa or
(3)kluaj (4)nam varieties; a hard-boiled egg, usually duck;
and liquor.[2] Other kinds of sweets, fruit, sugar cane, items
527 for betel chewing, chicken, salt, and rice might appear. As
796 these ceremonies were thought to be auspicious, purifying,
[783] therapeutic and protective, they were most elaborate at the
[751] great (1)tham-(1)khwan (soul-strengthening) ceremony, at
[755] house-raisings and at rites to local guardian spirits. The
[782] necessity of these ceremonies explains why when public structures
[346] were raised, a portion of the public funds were used
000 for a repast. In Bang Chan when donations for a new school

---

[1] Other priorities in service might be observed; for
example, at a celebration preceding ordination the priest-
[388] candidates were served next. At one small affair, when 11
[554] priests came to a home to conduct a service for a disabled
[574] old man who could not go to the temple, this elder was
served after the priests, then the research group who counted as visiting dignitaries, and finally the other family members, with the women who prepared the food, and the children, eating last. The general sequence prescribed by etiquette was: priests should be served before anyone else, old before the young, the males before females, persons with high status such as teachers and ceremonialists before low, urban before rural. Those who cooked and served came last of all. When the number of participants was large, guests might be served, as they arrived, over a period of hours.

[2] The presence of meat, fish and alcohol is this ceremonial food reflected non-Buddhist elements in Thai culture, and should not be viewed as a gross violation of Buddhist precepts.

In Bang Chan when donations for a new school
264 building warranted buying the foundation materials, so that
476 volunteer labor was solicited for their installation, some of
346 the money went into food, despite additional donations of
food. This was in no way misappropriation. Helping to cook
was as important as helping to dig the holes.

782 The spirit-offering, or the portions eaten by a partic-
264 ipant as a sacrament, were actually tiny bits of each food.
Afterward, the entire lay-out, pork, sweetmeats and all, was
eaten. Because all this was holy food, it was felt to be
especially strengthening, so was usually given to children,
but might be eaten by family members and occasionally, priests.
262 The pork was cut up and eaten with a hot sauce, or put into a
252 "with-rice" dish. It was especially appropriate with liquor.

262 The use of food ritually was not limited to the ceremon-
755 ial season nor to big events. The same purposes underlay the
852 use of a hard-boiled egg eaten in the ceremony that was de-
signed to restore a child "sick from temporary loss of its
soul," and in another performed in order to wean a baby.

43 The benefits of a (l)ngaan accrued to every participant
554 down to the last worker and contributor according to the degree
796 of assistance. With status in this and in later lives at
stake, no one hesitated to plunge into debt or even to sell
land. For the sake of economy two different ceremonies might
be performed on the same day, for example a child's topknot
cutting at a daughter's wedding.[1] The saving was in time and
expense for food preparation, but such multiple ceremonies
were performed less often than one might expect.

796 One assistance in the financing was that every invited
476 guest made a contribution, customarily 5 to 10 baht, which
435 helped defray the costs. In 1952, household heads reported
these contributions as totalling from 30 to 1.000 baht, with
an average of 343 for the year (Janlekha, 1955). Of 96 house-
hold heads who provided information on special expenses during
the 5-year period March, 1948 through February, 1953, 36 had
given (l)ngaan with net expenditures (costs minus contribu-
tions) ranging from -10[2] to 15,000 baht. The average net cost
was 4,361 baht (Janlekha, 1955). These figures might repre-
sent a single (l)ngaan or several events.

---

[1] Every desired ritual could be carried out at little cost. Thus a priest-candidate whose father was dead, was included in the pre-ordination festivities planned for a friend; and on one occasion five bodies were cremated at the same ceremony, which was sponsored by the kin of one of the deceased.

[2] The -10 meant that contributions exceeded the cost.

435
796
[126] Some information as to the cost in baht of the larger ceremonies held in 1954, and their scale, was obtained from the school teacher's diary. Examples follow:

[792] Ordination: Total cost 8,000, including food 1400, liquor 800. Guests contributed 4000.

[852] Top-knot tonsure: Total cost 1550, including new utensils 550; 6 priests fed; each priest given 12 baht; 12 (2)pin-(1)toos filled to take to the temple; 100 duck eggs donated, and 300 baht received from 30-40 guests.

[764] Cremation[1]: Total cost 40,000[2], including about 10,000 for food; 61 priests fed[3]. About 500 guests contributed 4377.

[875] Homage-to-the-teacher ritual:
A: Total cost 715, including food 565 and liquor 150; 40 tang (800 liters) fish and 3 tang Chinese noodles donated.
B: Total cost, 11,000[4].

[585] Wedding: A: Thai Buddhist: Total cost 5000. Guests gave 2300.
[583] B: Rite of forgiveness after elopement: a meal, with 5 bottles of liquor.
[184] C: Moslem: 2 buffalo slaughtered. 400 guests.

585
262 Arranged marriages could be large merit-making affairs, with a huge procession from one house to the other of twenty-four "pairs" of specified foods, i.e. two bearers each of
[583] sugar cane, fruits, sweetmeats and other things. At more modest weddings and the rite of forgiveness for a couple who had eloped, food might differ from the usual fare only by including the three essentials of a wedding: pork, chicken and alcohol.

273
796
443 Increased consumption of alcoholic beverages during the ceremonial season was indicated by the sales of one local

---

[1] Cremation was the last of several rites at death. Private 7-day, 30-day and 100-day rites were held, when priests came to the home to chant and to be feasted.

[2] With cooperative assistance from well-situated relatives in Bangkok.

[3] The whole chapter of priests from Wat Bang Chan
[792] was always included at cremations, and often others from a
[574] distance.

[4] See list of food purchased, Appendix A, pp. 102-103.

443 storekeeper: about 800-900 liter bottles per month during
273 the 3 months dry season as compared to about 350 bottles per
796 month during the 9 months of the rice season.

184 Moslems never served liquor at their weddings, crema-
[273] tions, and other auspicious events. Moslem residents occa-
sionally attended Buddhist (1)ngaan in spite of dietary pro-
[262] scriptions that Buddhists did not observe.[1] A medium (spirit-
ualist) commented however that because pig's head was essen-
tial for her homage-to-the-teacher rites, some Moslem sick
persons preferred to go to the Buddhist temple for treatment.
There the priest-practitioner could afford to set up a separate
kitchen for his Moslem patients, and so spare them the dis-
tress of confronting pork. To one big ordination Moslem
guests brought their own food. Buddhists came somewhat more
often to Moslem ceremonies.

262 We do not have enough information to appraise the nutri-
574 tional significance of food eaten at ceremonies. Some indi-
476 viduals got a great deal of it, others very little. One must
remember that the (1)ngaan was not a public but a private
264 event at home, to which guests came on invitation. Although
cremations and the teacher-rites of priest-practitioners were
held at the temple, and so had a semi-public character, no one
who was not invited presented himself for food. Of the par-
ticipants, the working group undoubtedly received the most
food; they were there the longest time, had regular meals,
tastings and snacks throughout the (1)ngaan meal itself. This
group comprised the host, co-sponsors and their immediate kin;
other relatives and friends who were asked or who volunteered
to help. The feeling was, if one were "very fond" of the
host, one volunteered to cook. If less close, one was invited
as a guest, but made the usual cash donation. Sociable per-
sons combining skill and energy were invited often and volun-
[584] teered often, hence spent many days at ceremonies. Young un-
married men and women were asked and liked to be asked to
work, for such occasions offered a great chance for fun and
flirting.

114 Different degrees of participation may be estimated
476 from Janlekha's (1955) figures for reported contributions
796 ranging from 30 to 1000 baht in a year. Since a contribution
of 5 to 10 baht per (1)ngaan was customary, the villager with
the lowest reported contribution probably attended from 3 to
6 ceremonial occasions. Attendance at 100 or more (1)ngaan
is unlikely, hence the villager who gave as much as 1000 baht
probably made larger contributions per (1)ngaan.

574 What sort of persons or groups in the village were in-
796 vited as guests? Every host's list included his older

---

[702] [1] Moslems were said to resist army service because
they were afraid they would have to eat pork.

796 relatives, his other kin and friends according to bonds of
574 affection and respect. Certain priests of pleasing personalities, wide acquaintance or kinship in the community, or of valued skills, were invited more often than others, as were prominent elders and hamlet headmen. An invitation usually went only to the elder couple in a family. It did not automatically include the children. If married sons or daughters were invited, they were asked separately. Poor individuals were included only in the festivities of their close kinfolk, their immediate neighbors, maybe their own hamlet headman, or persons to whom they were obligated. Unless they were aged, their presence was validated only by hard work. Reciprocity was a factor, for one who could not reciprocate presumably would not be asked, nor would he volunteer. The few who were "anti-social" for whatever personal reason rarely attended.

262 Most members of the working group and guests left at
574 home their children of such age as to require watching.
796 Nursing babies might be there, hung in a hammock. Though
858 the children who ran excitedly about seemed numerous, most of them were the children, grandchildren, nieces and nephews of host, co-sponsors and relatives, so could not be excluded.

To sum up, those who shared least in the diet of the ceremonial season were the dependent children, i.e. up to the age of 6 or so, the less gregarious, and the poor who had no way to reciprocate. Children from 7 to adolescence shared in a limited way, attending (l)ngaan of their own close kin or of a geographically close neighbor. Parents sometimes took snacks from the feast home to the children. On the other hand, persons of prestige and popularity, especially if aged, were asked frequently.

262 Doubtless for those who attended many (l)ngaan, the
796 food eaten during the ceremonial season differed considerably from the usual family fare. We have no way of knowing whether it was better than usual because of a larger intake, for instance, of pork and meat in general, or whether the total nutritive value was less satisfactory because of increased consumption of "empty calories" in the form of sugar and alcohol.

262 During the (l)ngaan season the home meal schedule was
264 frequently disrupted in the families of the participants.
796 The main cook might be absent, too tired, or too full to feel like cooking a big meal at home. In anticipation of a feast, preparation of the usual breakfast or dinner or both might be abandoned, with reliance on a few snacks for the stay-at-homes to add to their rice. Thus the food intake of family members who did not attend the ceremonials might be adversely affected.

000 One other aspect of (l)ngaan which should be mentioned

One other aspect of (l)ngaan which should be mentioned
252 in connection with food and health is the opportunity for con-
796 tamination of food. The villagers did not associate sanitation
751 with health, hence the hazards of a community meal which many
[753] persons helped to prepare were many. Two incidents observed the day before an ordination in early April, will illustrate. In the final stage of making Chinese noodles, rice flour paste was extruded through a perforated disk into an enormous pot of boiling water. When done, the product was removed with a fish net, and plunged into the canal to cool, after which women helpers spread it out on banana-leaf covered trays. Dishes were also washed before use in the canal, which was then too low for boats. Since, however, many people drank untreated canal water at this season (see p. 28), the added hazards for the participants caused by these procedures may have been slight.

262 In summary, food plays a major role in ceremonies and
792 festivities, which are concentrated in the 3 months' dry season. Proposals for dietary improvement in Bang Chan must take into account not only the possible effects of the (l)ngaan season on the total nutrient intake, and on opportunity for exposure to contaminated food, but also the importance of these affairs from the standpoint of merit and prestige, and the relatively great financial burdens which villagers therefore undertake because of them.

QUANTITATIVE DIETARY STUDY: FOODS EATEN AND ESTIMATED NUTRIENT INTAKE OF SELECTED FAMILIES IN BANG CHAN

Procedure

121
125
146

Selection of the Sample

Medical inspection designed primarily to discover possible signs of nutritional deficiency was carried out in advance of the family dietary study. The suggestion of Grant (1948) that matched groups, of contrasting economic or other status be studied, appeared to be appropriate to the situation in Bang Chan. Our hope was to be able to select from the random sample of families given medical inspection (Hauck, 1956) a group of families (A) in each of which several members had clinical signs which might be evidence of malnutrition, and a group of families similar in age and sex distribution (B) in each of which the members were largely or wholly free from such signs.

125 When the medical inspection of the random sample was
146 complete, however, too few of the families were found to meet our criteria for inclusion in Group A, i.e. the group of apparently less well nourished families. Additional families for

125 146 this group were located by checking the list of school children, all of whom had been examined, for instances in which 2 or 3 children in one family had signs possibly indicative of malnutrition. The remaining members of their families were then examined. Families appropriate for Group B were chosen from those in the random sample.

Note that the groups for inclusion in the weighed dietary study were selected on the basis of apparently contrasting nutritive status. They did not represent a random sample of village families, although 7 of the 11 families included in the dietary study were in the random sample chosen for the medical inspection. In the absence of recommended dietary allowances for Thai, study of food intakes of two such groups seemed likely to yield more useful information than would be obtained from a dietary survey of a random sample of the population.

The groups chosen for study included 11 households, 6 in Group A and 5 in Group B, with 30 members in each group, paired so far as possible according to age and sex. When the survey was begun, however, 2 additional members were found in the households in Group A and 7 additional members in Group B. These were relatives and hired helpers who remained in the households throughout the survey year. The field worker who carried out the dietary study rearranged the matching plan somewhat, so that 32 reasonably well matched pairs were obtained (Table 6). In planning this rearrangement, the observer had in mind pairing persons of similar size, so far as possible, in addition to pairing by sex and approximate age.

Estimation of Caloric and Nutrient Allowances

Because of the 5 additional unmatched persons in Group B, males aged 23, 15 and 4 years, and females aged 79 and 82, some means was sought of checking the validity of comparing calculated per capita food and nutrient intakes for the two groups. By selecting matched groups differing in apparent nutriture, we had hoped to avoid comparing calculated nutrient intakes with an arbitrary standard, but comparison of estimated per capita nutrient needs of the two groups appeared to provide one means of checking the probable comparability of our groups, even though their members were not all matched as originally planned. No nutrient allowances had been proposed for Thai, however, so Nicholls' (1951, p. 315) allowances for people in the tropics were modified by taking into account information in Recommended Dietary Allowances of the National Research Council, Food and Nutrition Board (1953) and FAO recommendations concerning caloric requirements (FAO Committee on Caloric Requirements, 1950). The resulting basic table of allowances for Thai people in Bang Chan (Table 16, p. 104) is conservative, and probably represents something like a

[Text continues on page 57 --- Analyst]

125 Table 6. Persons in the Two Groups of Families in the Dietary Survey, Matched According to Age and Sex, So Far As Possible

Group A (6 families, 32 persons)			Group B (5 families, 37 persons)		
Code Number	Sex	Age	Age	Sex	Code Number
521	M	63	64	M	711
621	M	52	53	M	701
995	M	50	48	M	601
991	M	41	42	M	751
981	M	38	39	M	731
971	M	30-33	25	M	603
523	M	22	22	M	605
623	M	21	20	M	713
522	F	60	59	F	712
622	F	49[1]	49	M[1, 2]	703
996	F	44	44	F	602
992	F	37	38	F	732
982	F	35	39	F	752
905	F	31	31	F[2]	704
525	F	20[2]	22	F	604
986	M	15[2]	15	M	606
309	M	12	13	M	754
206	M	11	12	M	485
184	M	10	10	M	755
153	M	10[3]	13	M[2, 3]	705
266	M	10	7	M	167
524	M	5	6	M	733
483	F	13	15	F	702
320	F	12	10	F	229
130	F	10	10	F	128
107	F	8	8	F	180
187	F	7	7	F[2]	706
997	F	8[3]	16	F[3]	753
983	F	6	6	F[2]	707
984	F	3[1]	4	M[1]	756
972	M	1	2	M	735
985	M	3 mo.	3 mo.	M	757
			23	M[2, 4]	709
			82	F[4]	758
			79	F[2, 4]	708
			15	M[4]	714
			4	M[4]	734

1. Not matched by sex.
2. Extra persons who were not in groups as selected.
3. Not matched by age. In the case of the 10 and 13 yr. old boys, actual body sizes were comparable.
4. No corresponding person in Group A.

126 146 nutritional floor for this population, beneath which maintenance of health cannot be assumed. From this table, allowances were estimated for persons of each age and sex, for Groups A and B (Table 17, p.109. Estimates were made for each quarterly period or Round, during which each family was visited once, and these were averaged to obtain mean per capita allowances for each group for the year (Table 18, p. 108. In each group, one woman was in late pregnancy during the third Round, and a new infant had been added to each group in the fourth Round. Since young infants in Bang Chan are given little more than mother's milk, allowances for the fourth Round were adjusted to account for an additional nursing mother, but not for the infant itself. Differences in estimated per capita allowances for Groups A and B were trivial (Table 18, p.108), hence we felt justified in comparing the estimated food and nutrient intakes of the groups as originally planned, even though Group B contained 5 persons not matched with persons in Group A.

Method of Collecting Data

124 125 The procedures we planned to use were first pretested in several households to give the observer experience and to be sure that the method would actually work under conditions in Bang Chan. Following the pretest, each family chosen was told in a preliminary interview, what the observer wished to do, and in what ways family members would be expected to cooperate (Appendix C, p. 109. All families that were asked to participate in the study consented. They were not notified in advance just when the observer would visit. Observations on each family included food intake for a 24-hour period, 4 times during the year: twice during the rainy season, and once each during the cool and the hot, dry seasons.

Survey days were planned so as to avoid special festivals when food preparation might be unusual. Six of the 44 survey days fell on (1)wan (4)phra, the weekly holy day. The families visited on (1)wan (4)phra did not, however, take food to the temple on those days, hence food preparation and consumption was probably not unusual.

Alternate visits to the families in Groups A and B were planned so that seasonal variations in food supply would not be apt to account for any observed differences in food intake. Again, our plan could not be fully carried out. Occurrence of cooperative transplanting and other interfering circumstances made some modifications in schedule necessary. Since the objective was to learn about the usual family food intake, the study was not carried on when several members of the family were away from home, or when the participating family was preparing to feed neighbors who were helping with farm work. In such a case, the field worker would go to the nearest

124 participating household which had not been visited during that
125 Round of the study. The order and dates of visits to Groups A and B, data from which were used in calculating food and nutrient intakes are shown in Table 7. During three periods of about one month each all visits were to families in Group A, hence some differences in the use of foods between the two groups might be attributed to the order of visits.

Table 7. Order and Dates of Visits to Households Participating in the Dietary Study[1]

Round	Date	Group	Household No.	Round	Date	Group	Household No.
I	May 26, '53	A	67	III	Nov. 26, '53	A	67
	June 4, '53	A	222		Dec. 3, '53	A	222
	June 11, '53[2]	A	2		Dec. 10, '53	A	2
	June 24, '53	A	12		Dec. 17, '53	B	21
	July 2, '53	B	21		Dec. 21, '53[2]	B	23
	July 8, '53	B	23		Jan. 7, '54	A	103
	July 16, '53	A	103		Jan. 14, '54	A	12
	July 23, '53	B	16		Jan. 18, '54	B	16
	July 31, '53	B	25		Jan. 28, '54	B	25
	Aug. 6, '53	B	20		Feb. 4, '54	B	20
	Aug. 13, '53	A	215		Feb. 10, '54	A	215
II	Aug. 27, '53	A	222	IV	Feb. 18, '54[2]	A	67
	Sep. 3, '53	A	2		Feb. 25, '54	A	222
	Sep. 10, '53	A	67		Mar. 4, '54[2]	A	2
	Sep. 24, '53	B	21		Mar. 9, '54	B	23
	Oct. 1, '53[2]	B	23		Mar. 18, '54	B	21
	Oct. 15, '53	A	103		Mar. 24, '54	A	103
	Oct. 22, '53[2]	A	12		Apr. 1, '54	A	12
	Oct. 29, '53	B	25		Apr. 5, '54	B	16
	Nov. 5, '53	B	20		Apr. 25, '54	B	25
	Nov. 12, '53	A	215		Apr. 30, '54	B	20
	Nov. 19, '53	B	16		May 8, '54	A	215

---

1. Two visits, data from which could not be used due to abnormal circumstances, are not included.

2. (1)wan (4)phra, the Buddhist holy day.

124 125 On the basis of experience during the pretest, the observer began the 24-hour period of observation with an unannounced visit in the afternoon, in time to see the preparation for the evening meal. This proved to have several advantages. A householder whose home had been visited at the evening meal, and who anticipated the observer's return before breakfast, could restrain the dog, if necessary; or the homemaker might postpone washing the rice until the observer arrived to weigh it. Without such cooperation on the part of the homemaker, our records would have been much less complete [405] than they were. Since few village families had clocks, the time when the homemaker said she would start breakfast was always approximate.

125 262 Foods were weighed in both the raw and cooked states, and foods given to priests, fed to animals, left over, etc. were weighed so that the actual amount eaten by the family could be calculated. Previously cooked foods included in the survey meals were weighed and raw weights estimated from information obtained in other observations. If possible, snacks were weighed. School children and others who ate snacks away from home were asked to report them to the observer, and weights were estimated. 128 262 The guides prepared for the observer are included in Appendix C, pp. 110-111. Data were recorded on the schedule, shown in Appendix C, pp. 116-120. and essential information such as the weights of food, after allowing for weight of containers, was later transferred to the shorter form shown in Appendix C, p. 121. As examples some of the data obtained on 3 of the 44 survey days are shown. Examples of notes on procedures in food preparation are included with these records. For examples of notes on the food intake of individuals see Appendix A, p. 97.

Calculation of Nutritive Value of the Diets

Figures from the original records were transferred to the Form for Calculating Raw Weights of Foods Eaten (Appendix C, p. 121), and the edible portion of each raw ingredient consumed was calculated by adjusting the gross amounts according to the use made of the cooked food and the number of family members present. Procedures followed are outlined in Appendix C, pp. 113-115.[1]

Few analyses of Thai foods had been made in Thai laboratories, and most of these were for proximate composition only. Therefore, data from other available sources were used. Since Handbook No. 34 of the United States Department of Agriculture "Composition of Foods Used in Far Eastern Countries" (Leung

---

[114] [1] Many of the calculations were checked by Mrs. Mary Barkley Campbell, who made independent use of the data.

128 et al. 1952) included more of the foods used than any other 262 table, it was used as the primary source of information. Other food value tables (p. 92) were used to supplement it. When two or more values were found for a given food, the more suitable one was selected on the basis of the nature of the food and the method of preparation for sampling, i.e. whether this method was similar to procedures used in Bang Chan. While this study was in progress Tables Showing Food Values for Calculation of Diet Records compiled by the Food and Drug Division, Department of Health (1953) and intended for use in Thailand, were published. These tables, however, included few analyses made in Thailand, and references were not given to the sources from which the values were compiled. For these reasons, the Thai table was used as a supplement only when values could not be found elsewhere.

For convenience in calculation, a table was compiled which contained the most appropriate values available for all items of food eaten on the survey days (Sudsaneh, Campbell and Hauck, 1954). A list of foods for which no nutritive values were calculated, for lack of available information, is given in Appendix C, p. 124. Foods for which values were found elsewhere than in tables, or for which values were imputed by the authors, are listed in Appendix C, pp. 124-125.

Although values for coconut milk were found, they did not seem to be appropriate for the product as prepared in Bang Chan. Coconut milk, (4)naam (2)ka-(4)thi, is a product made at home from fresh coconuts, and used frequently in preparing curries and other dishes. Families in Group A used considerably more water in proportion to coconut meat in making coconut milk than families in Group B, hence a single set of figures was not appropriate for both groups. Since "expressed coconut milk" which had been analyzed in Hawaii (Hawaii Agr. Expt. Sta. Bull. 77, 1936) appeared to be similar to coconut cream, (5)hua (2)ka-(4)thi, as prepared in the village, the composition of coconut milk was estimated by assuming it to contain carbohydrate, protein and fat in the same proportions as "expressed coconut milk" but to be more dilute (Appendix C, pp. 128-129)

Division of food into various food groups, and foods included in each, is shown in Appendix C, p. 126. For each survey day, the adjusted consumption of like foods was added together and the calculated total intake of each food item for each household during one 24-hour period was transferred to the Form for Calculating Nutrients in Foods Eaten. The nutrient content was then calculated. Two such calculations are shown (Appendix C, p. 122). Nutrients available[1] per capita

---

[1] Figures used were for the edible portion of raw food, or the food as used in food preparation, i.e. dry salted radish, shrimp paste, etc., with no allowance for cooking losses.

128 per day were calculated for Groups A and B by Round and for 262 all survey days (24 days for 6 families in Group A, 20 for 5 families in Group B). The total amounts eaten per capita per day, of various food groups, and the relative nutrient contributions of these groups were also calculated.

Results and Discussion

Socio-Economic Situation of the Two Groups of Families Studied

124 General Socio-Economic Conditions. - In the course of the study the observers were able to obtain information, both by inquiry and direct observation, on the economic condition of the families. Questions about land holdings, the amount of land farmed, number of working buffaloes owned, number of priests to whom food was given and sources of income, were asked during the second Round of the survey, after the participants were acquainted with both the field workers and the procedures. As raw foods were weighed, the observer asked if they were home grown or prepared, and recorded the cost of foods purchased.

125
146 Although our sample was not stratified with respect to 184 economic condition, the families in Group B, i.e. those chosen for apparently better nutriture, proved to be more [434] prosperous than those in Group A (Table 8). With the exception of Household 222 in Group A, rice production was the [433] main source of income. Families in Group B had a greater capital investment in land and buffalo, and worked more land, having more productive hands per family available. Farm work was finished sooner, hence members could begin intensive [859] fishing earlier than in Group A. All children aged 13-15, in both groups, did light farm work and/or selling in market, cooking, baby tending and care of buffalo. In all households, husband or wife or both came from old families in the community, hence had extensive kinship relations.

125 From the viewpoint of parents, the "peak of life" was 511 the time when children were no longer dependent, but produc- 592 tive, unmarried workers whose earnings stayed within the 434 family. Household 16 was such a family, forward looking, 463 progressive and optimistic. The successful and respected couple in Household 25 would enter this "peak of life" situation in a few years. Household 20 included a widower and his almost grown daughter living with his younger brother and the latter's family, and their senile mother, in harmonious cooperation. Ample land, housing, buffalo and farm labor combined with other skills, made for good living. In Household 21, two strong, unmarried sons still lived with their elderly parents. The only poor family, of low status, in Group B, was Household 23. By great industry, especially in

[Text continues on page 63 --- Analyst]

Table 8. Summary of Economic Conditions of the Two Groups of Households Participating in Dietary Studies

Household		Land			Food Cost[2]		No. of Priests Fed	Sources of Income
Group and Code No.	Members	Rai Worked	Rai Owned	Buffalo[1]	Total	Per Cap.		
Group A								
222	5	0	0	0	2.96	0.59	0	Labor contractor; hired out as labor; boat repair; fishing; vegetables sold; canal digging.
12	3	12	0	1	2.70	0.90	0	Rice production; occasional work in Bangkok.
215	5	14	0	1	1.59	0.32	0	Rice production; wife, a medium.
67	5	16	6	1-C	2.52	0.50	0	Rice production; eggs sold; road jobs.
2	6[3]	20	0	2	3.97	0.66	3	Rice production; "professional cook".
103	8	47	12	5	2.04	0.26	2[4]	Rice production; eggs, fish, mushrooms sold; buffaloes raised.
Mean		18.2	3.0	1.6	2.37	0.49	0.7	
Group B								
23	8[3]	6	0	1	1.56	0.19	0	Rice production; selling fish and vegetables; masseur.
21	4	25	25	3	1.92	0.48	3	Rice production; headman
16	8	47	47	5	2.70	0.34	2	Rice production; vegetables, fruit sold; road jobs.
25	8	50	50	3	7.97	1.00	2	Rice production; eggs, mushrooms sold.
20	9	66	51	1[1]	2.47	0.27	2	Rice production; ceremonialist; doctor; carpentry; trading; eggs collected and sold.
Mean		33.8	34.7	2.6[1]	3.32	0.45	1.8	

[1] The buffalo belonging to Household 67 died during the year. In Household 20, the brother who moved in owned several buffalo, thus the total for Group B was more than the number shown.

[2] Average cash expenditure per day, in baht. (One baht equalled about 5 cents.) Household 222 received rice as part of wages.

[3] Babies born during Round IV were not included. In Household 23, a 12-year old son served as temple boy and was away from home much of the time.

[4] Rainy season only, when priests could come by boat; counted as 1 in computing average.

125 fishing and selling vegetables, they managed to obtain a fair
592 diet. The father's skill as a masseur was valued especially
511 at periods of heavy farm work, after childbirth, and by the
434 cooks at a ceremonial feast. This brought in from 2 to 12
463 baht per week.
[262]

In Group A, Families 67 and 103 were at the most difficult period of life, with young, dependent children, and
[235] housing, land and equipment to be acquired. By great industry, including egg production from a flock of 60 chickens, and by severe "belt-tightening," Household 103 was lifting itself into a propertied position. The parents in Household
[591] 67 were shy. One or the other of the two older children
[591] often stayed home from school to look after the baby, so
[124] that both parents could work. Husband and wife in Household 12 were both very shy, the only ones in the survey group who
[152] were at all reluctant to participate. They seemed ashamed of limited food. The wife was frequently ill. In Household
[443] 222, the 14-year old daughter often gathered and sold vege-
[593] tables at Minburi before school in the morning. She might have full charge of the younger children for days at a time. A daughter who worked as a servant in Bangkok contributed 50 baht per month to this household. In Household 215, the
[465] activities of the wife as medium were predominant. Pay included food, often cooked, and the free use of 3½ rai of land, as well as cash. Maintenance of a son in school in
[935] Bangkok cost about 1000 baht per year plus 60 tang of rice.
[871] In Household 2, the elderly wife's services as "boss-buyer and cook" at ceremonials, and as marriage go-between did not bring in cash, but gifts, clothing and much participation in feasts.

431 All families in the survey group were Thai Buddhists,
262 and 6 of them offered food to priests more or less regularly.
792 On 17 of the 24 survey days when the observer visited these
[779] households, food was offered. Two of the 5 families that did not customarily give food to priests, did so on one and two survey days, respectively. In one case food was offered to a son who had been recently ordained. Rice was always included in the food offered, and in 3 of the 20 instances observed rice only was given. The weight of cooked rice given by one family in one day ranged from 185 to 1210 grams, with an average of about 600 grams. In 16 instances, some cooked food such as fish or vegetable curry was given with the rice; in one instance fresh pineapple was given.

511 Cash Expenditures for Food. - Mean total, and per
[128] capita daily cash expenditures for food for survey days, are shown, by household in Table 8. (See Table 2, p. 23 for division of food expenditures for Groups A,B) Although cash expenditures for food varied considerably, the amounts in all cases were small, and approximated figures obtained by Janlekha (1955) for 106 households. Larger consumption of animal products, which were the most expensive items purchased,

511 appeared to account in large part for the greater cash expenditures
of some families than others. Thus Household 25,
with the highest total and per capita cash expenditure for
food among these 11 families, consumed a larger quantity of
meat than others, and often bought beef, which was the most
expensive item purchased. This household bought fruit, meat,
[554] and vegetables from venders almost every day. They said
[822] "Some do not pay money to buy food, but pick or get it from
the canal or gardens —this family cannot live like that because
they come from a rich family and cannot live on poor
food, so most of the money goes for food." The husband said
"I cannot work on poor food." In Group A, Household 12,
which had the highest per capita food expenditure, had little
home produced food. The wife, who went to Bangkok often,
usually bought food when in town. Household 2, with a total
cash expenditure for food higher than others, did not have
pork or beef on survey days, but ate more (1)plaa (1)thuu,
a sea fish which is purchased.

433 Home Production of Food. - In keeping with the general
511 pattern in the community, the families surveyed produced most
of their own food.

243 Rice. - The hired laborer received rice as part of his
pay, but all other families produced their own. Seven households
[465] used polished rice exclusively (Table 9). The only one
256 to use home pounded rice in major part was Household 103.
[262] This family lived near a little canal which was dry in summer,
so they were using home pounded rice when visited toward the
end of March and in mid-July (Rounds IV and I). When the observer
came in January (Round III), transportation of rice to
the mill by boat was possible, but the family members had
little farm work to do and were willing to spend some time
milling rice. This family, which lived in the home-milling
area (see p. 40), took rice to be milled only during the harvest
season when they were busy, and the level of the canal
was still high. The families which used home pounded rice in
minor part did not live in the home-milling area, and apparently
milled rice at home only when they were unable to get
to the mill by boat.

244 Fruits and vegetables. - Although the Thai government
[554] has attempted to encourage kitchen gardening, few vegetables
and fruits were produced by the families which cooperated in
[245] the dietary study (Table 10). All families grew bananas, and
certain common ingredients of curries: chilies, bergamot,
galangal and lemongrass. No other plants were grown by as
many as half of the families studied.

222 Of the edible plants which grew wild, swamp cabbage was
262 used by 7 families on 11 of the 44 survey days. Bamboo shoots,
the white flowers of the West Indian pea tree and yellow (2)sa(5)noo
flowers were used by 3 families on one day each;

256
262 Table 9. Use of Home-milled and Polished Rice by Households Participating in the Dietary Study

Group and Code No.	Round of Dietary Study[1]							
	I		II		III		IV	
	HM[2]	P[2]	HM	P	HM	P	HM	P
Group A								
2		x		x		x		x
12		x		x		x		x
67	x			x		x		x
103	x		x			x	x	
215		x		x		x		x
222		x		x		x		x
Total No.	2	4	1	5	0	6	1	5
Group B								
16	x		x			x		x
20		x		x		x		x
21		x		x		x		x
23		x		x		x		x
25	x			x		x		x
Total No.	2	3	1	4	0	5	0	5

1. For dates, see Table 7, p. 58.

2. HM and P stand for home-milled and polished rice respectively.

222 truffles were used as snacks on 2 occasions, and (1) bauaun,
262 (2)phag (2)tob, lotus stems and lotus seeds, the latter as a snack, were used once each. The two groups of families appeared to grow fruits and vegetables and to gather edible wild plants to about the same extent. Two families, one in
244 each group, raised mushrooms during the period when farm work was slack.

5

244
246

Table 10. List of Edible Plants Grown by the Two Groups of Households Studied

Name of plant[1]	Number of Families	
	Group A	Group B
Green and leafy vegetables		
Basil	3	1
Bean, string	1	-
Chili	6	5
Coral[2]	-	1
(3)Khii-(2)leg[2]	1	1
(4)Khlyb[2]	-	1
(4)Ma-(1)dan[2]	2	1
Morinda	-	1
(2)Sa-(1)daw[2]	-	1
Other vegetables		
Bamboo	1	2
Calabash	3	1
Egg plant	2	1
Gourd	1	-
(2)Kha-(1)cauaun	1	-
Mushrooms, straw	1	1
West Indian pea tree[2]	1	1
Fruits		
Banana	6	5
Guava	1	1
Jujube	1	-
(4)Ma-(1)dan[2]	2	1
Mango	1	1
Manila tamarind	1	-
Star gooseberry	1	-
(2)Ta-(1)koo	-	1
Spice plants		
Bergamot	6	5
Galangal	6	5
Ginger	2	-
(2)Ka-(1)chaaj	1	2
Lemongrass	6	5

---

[1] See list, Appendix C, p. 126 for botanical names.

[2] Trees

235 Eggs and poultry. - Every household which took part in the survey raised chickens, and 3 of the 11 households had ducks also. In both groups of families, most of the eggs produced were sold. Home consumption of eggs on survey days was small.

228 Fish. - Each family studied had a fish pool. One family only, Household 25 in Group B raised tilapia. They began tilapia culture during the third round of the study, too late to ascertain how this might affect fish consumption in the family.

251 Preservation of Foods at Home. - Home food preservation was practiced to a very limited extent only, fish products being the principal ones produced.

Dried fish. - Families in both groups salted and dried fish throughout the year whenever they were available in excess of immediate needs.

Fermented fish. - In 10 of the 11 households, fermented fish was prepared. The 6 families in Group A had prepared a total of 30 kg., and 4 of the 5 families in Group B, a total of 29 kg. The largest amount prepared in one household, for one year was 10 kg.

Shrimp paste. - Because shrimp were caught in insufficient quantity, shrimp paste was prepared by only 6 of the 11 families. Four families in Group A prepared a total of 26 kg., and 2 families in Group B prepared a total of 7 kg. These amounts were insufficient for their needs.

Fishsoy. - One family only, in Group A, prepared fishsoy. All others in both groups purchased this product.

Buffalo meat. - During the survey year, the buffalo belonging to one family died. Some of the meat was used fresh for curry, and the remainder was salted, dried and sold.

Comparison of Caloric and Nutrient Intakes of the Two Groups With Each Other and With the Estimated Allowances.

128
146 In Table 11, the estimated calories and nutrients available to the two groups of families, are shown together with the estimated allowances.

146 On the average, the number of calories, and amounts of protein, iron, niacin and ascorbic acid in the diets of persons in Group B, the apparently better nourished group, approximated or exceeded the conservative allowances. For Group A, this was true for niacin and ascorbic acid only, the calories being 11%, protein 15% and iron 21% below the allowances.

146 Table 11. Comparison of Calories and Nutrients Available to Groups A and B, with Each Other and with the Estimated Allowances

Average per capita per day

	Estimated amounts available[1]		Allowance	
	Group A	Group B	Group A	Group B
Food energy, calories	1731	2009	1935	1955
Protein, gm	50	59	59	59
Fat, gm	14	22	-	-
Carbohydrates, gm	342	384	-	-
Calcium, mg	129	194	650	650
Phosphorus, mg	847	895	-	-
Iron, mg	6.9	8.4	8.7	8.8
Vitamin A, I.U.	2047	1340[2]	2522	2548
Thiamine, mg	0.68	0.76	0.93	0.96
Riboflavin, mg	0.37	0.28	1.07[3]	1.06
Niacin, mg	11.3	11.5	9.3	9.6
Ascorbic acid, mg	27	23	24	24
Thiamine/calorie ratio	0.39	0.38		
Thiamine/non-fat calorie ratio	0.42	0.42		

[1] Estimates based on values for edible portion without allowance for cooking losses. Analyses for a number of common foods were incomplete (See Table 13, p. 75).

[2] No values found for flowers of Sesbania roxburghii, therefore these are not included.

[3] Slightly higher allowance for Group A because of presence of one more nursing mother in this group than in Group B.

146 Average intakes of riboflavin were estimated to be about a third, or less, of the allowances. Estimates of calcium intake were, on the average, only 20% of the allowance for Group A, and 30% of that for Group B. Although the calcium allowances were thought to be conservative, estimated requirements based on calcium balance experiments are believed by some investigators to reflect usual intake rather than need, and the extent to which man may adapt to a low calcium [141] diet is still undetermined. Among residents of Bang Chan, no evidence was noted other than short stature and small bones, which might suggest a calcium deficiency.

The vitamin A value of diets of both Groups A and B [164] appeared to be low. Clinical signs possibly associated with vitamin A deficiency, i.e. xerosis and phrynoderma, occurred among residents of Bang Chan (Hauck, 1956), and as would be expected from the method of selection of the two groups, such skin signs were more prominent among members of Group A than Group B. On this basis one would expect the vitamin A intake of Group A to be less than that of Group B, whereas the reverse appeared to be the case on the survey days; but the higher estimated vitamin A value for the diets of Group A than Group B may not represent a real and consistent difference. The yellow (2)sa-(5)noo flowers, for which no nutrient values were found, were used rather liberally by some families in Group B at one season and may have contributed vitamin A value. Moreover, owing to unavoidable changes in the plan for alternating visits to the two groups of families, those in Group B were visited more often when the level of water in the canals was low and the leafy water plants were not available. The unusual intake of a large amount of yellow sweet potato by one family in Group A on one survey day may also have tended to [263] distort the picture. Families in Group A, however, used substantial amounts of sweet basil leaves, whereas in Group B, this herb was used for seasoning only.

The estimated amount of thiamine available per capita, before cooking, was 73% of the estimated allowance for Group A and 79% for Group B. Since over four-fifths of the thiamine content of the foods used by each group came from rice, and the thiamine loss when rice is cooked as it was in Bang Chan has been estimated as 75% or more (Tmangraksatve and Srisukh, 1955) the actual per capita intake of thiamine must have been below the value of 0.23 mg. per 1000 calories which the Food and Nutrition Board, National Research Council (1953) con-
146 sidered to be the minimal requirement for adults. According
164 to Nicholls (1951, p. 87), a ratio of Thiamine: Non-fat Calories of 0.3 - 0.35 is borderline and too low, and ratios below 0.3 are associated with beriberi-producing diets. That the diets of some of these people, as eaten, were in fact dangerously low in thiamine, is attested by the occurrence of beriberi and history of beriberi among them. Of the 15 persons, 20 years of age or older in Group A, 7 had knee jerk

146 164 absent, and in 6 of these, ankle jerk was absent also. In Group B, the apparently better nourished group, one adult and two school boys had knee jerk only absent. In Group A, Household 12, the father, mother and 21 year old son all had both knee jerk and ankle jerk absent. The son was diagnosed by the examining physician as having frank beriberi at the time of the medical inspection. In Household 2, the father and 23 year old son had both knee jerk and ankle jerk absent, but the mother had no signs of thiamine deficiency. In Household 67, mother and father had both knee jerk and ankle jerk absent. The mother had lost 3 of her 6 children when they were 3 or 4 months old, with symptoms such as convulsions and voiceless crying, suggestive of infantile beriberi. When the third child died, the mother had symptoms of beriberi, and the physician who conducted the medical inspection considered the death of this child to be due to infantile beriberi. Clearly the thiamine content of diets of some of the families studied was inadequate to meet their needs under varying conditions of activity and stress. Beriberi was the one frank deficiency disease observed while these studies were underway in Bang Chan (Hauck, 1956).

146 Fat provided only about 9 to 10% of the calories. Coconut oil contains only about 0.5% of linoleic acid (Anantakrishnan, et al., 1949), but the essential fatty acid content of the diet as a whole was not estimated.

146 164 In summary, although the estimated nutrient intakes of Group B were in general more favorable than those of Group A, the contrast between the two groups was not striking. Perhaps we should have anticipated this from the fact that the groups did not present a clear contrast in apparent nutriture. In Group A, 19 of the 30 persons examined had a total of 36 possible signs of nutritional deficiency. In Group B, 8 persons had a total of 9 such signs. Judging by both the apparent nutriture of the household members, and by their estimated nutrient intakes, the diets of both groups were in need of improvement.

146 Contribution of Food Groups and Certain Common Foods to the Nutritive Values of the Diets

[128] Contribution of Food Groups and Individual Foods. - The percentages of the total calorie and nutrient intakes provided by various food groups for households in Group A and B are shown in Table 12.

146 262 Rice and other cereals. - Rice was the staple food, which provided over 4/5 of the calorie intake and more than half of the protein for both groups. Much of the difference in calorie and protein intake of the two groups was due to the greater rice consumption of Group B. Rice was also the

[Text continues on page 72--- Analyst]

146
262

Table 12. Percentage[1] of Total Caloric and Nutrient Intakes Provided by Each Food Group

Food Group	Family group[2]	Calories	Protein	Fat	Carbohydrate	Minerals			Vitamins				
						Ca	P	Fe	A	B_1	Ribo.	Niacin	C
Rice and other cereal	A	85	57	23	92	23	75	52	1	82	38	66	-
Home-milled rice		20	14	7	21	8	24	16	-	26	13	25	-
All other		65	43	16	71	15	51	36	-	56	25	41	-
	B	82	54	16	93	16	75	46	-	84	51	64	-
Home-milled rice		9	6	2	10	3	12	7	-	14	9	13	-
All other		73	48	14	83	13	63	39	-	70	42	51	-
Fish and other animal foods	A	7	37	40	-	34	18	15	4	7	21	28	-
	B	7	40	29	-	43	19	15	10	8	29	29	-
Green and leafy vegetables	A	1	2	1	-	14	1	8	79	2	31	1	25
	B	1	2	1	1	23	1	17	76	2	10	2	38
Other vegetables	A	3	3	3	3	15	5	13	15	7	8	3	58
	B	2	3	4	2	8	4	7	5	5	8	4	37
Coconut and products (other than oil)	A	2	1	18	1	-	-	-	-	-	-	-	-
	B	3	1	21	1	-	-	-	-	-	-	-	-
Fruit	A	1	-	1	1	3	1	2	2	2	2	1	17
	B	-	-	-	-	2	1	1	9	1	2	-	23
Fats and oils	A	1	-	14	-	-	-	-	-	-	-	-	-
	B	3	-	29	-	-	-	-	-	-	-	-	-
Sugar	A	1	-	-	2	4	-	9	-	-	-	1	-
	B	2	-	-	3	4	-	14	-	-	-	1	-
Miscellaneous and spices	A	-	-	-	1	7	-	1	-	-	-	-	-
	B	-	-	-	-	4	-	-	-	-	-	-	-

1. Figures rounded to nearest whole number. The dash indicates value less than 0.5%. Analyses for a number of common foods were incomplete (see Table 13, p. 75).

2. Group A included apparently less well nourished families, Group B, apparently better nourished families.

146 262 most significant source of phosphorus, iron, thiamine, riboflavin and niacin in these diets. Although the calcium content of rice is low[1], about 23 and 16% of the estimated calcium content[2] of diets of Groups A and B respectively came from the cereal groups. Glutinous rice and various products such as noodles made of rice flour were eaten occasionally in small amounts. These and other cereals and cereal products, such as wheat bread and popcorn contributed little to the total nutritive value of the diets.

Animal products other than pork fat. - Fish and other foods of animal origin furnished about 2/5 of the protein in the diets of both groups. From 20 to 30% of the riboflavin and niacin and substantial amounts of phosphorus and iron were provided by this food group, also. For families in Group A, these animal products provided substantially more fat than the group of fats and oils as such, whereas Group B obtained about the same amount of fat from these two food groups. The estimated contribution of vitamin A from this group was small. Specific analyses for most of the varieties of fish used in Bang Chan were not available, however, hence many calculations were made on the basis of average values for "fat fish," "lean fish," and "dried fish."

Although a substantial part of the calculated calcium content of the diets came from animal products, the amounts were only about 8 and 9% of the estimated allowances for Groups A and B respectively. Fermented fish are reported to contain 1126 mg. per cent of calcium (Knudson, 1955) but the amounts eaten were relatively small. Two families only in Group A used a total of 217 grams of fermented fish on survey days, and two families in Group B used a total of 608 grams. These amounts, though they represented servings of only 20 grams per person for the two families in Group A, and of 36 grams per person for those in Group B, nevertheless increased the estimated average calcium intakes substantially, so that 43% of the calcium in diets of Group A, and 34% in diets of Group B, were provided by animal products. The tiny dried fish which are eaten whole, were not used by the families studied on any of the 84 survey days.

On the average, the contribution of animal products other than fish to the nutrient content of these diets was small.

---

[256] [1] According to Knudson (1955), addition of calcium carbonate to rice during the milling process was not practiced in Thailand.

[276] [2] No attempt was made to estimate calcium intake from betel chewing, although this might be considered a dietary source of calcium. Six of 15 persons twenty years of age or older, in Group A, were betel chewers, whereas among 14 persons over twenty in Group B, 9 chewed betel regularly and one occasionally.

[246] [262] Eggs were eaten occasionally; pork and beef were bought infrequently and in small amounts by some families. One family only, ate chicken; other meats eaten on survey days included buffalo, frogs, eels and field rats.

Vegetables. - More than three quarters of the estimated vitamin A value of these diets was provided by green and leafy vegetables, although the pale yellow sweet potatoes, eaten in quantity by one family in Group A increased the vitamin A from other vegetables substantially. The greater use of swamp cabbage, a wild aquatic plant by families in Group A, may be explained by the fact that more visits to this group occurred when the water level in the canals was relatively high. Families in Group B, however, used a greater variety
[263] of greens, especially leaves from a number of trees. For families in Group A, sweet basil contributed substantially to the vitamin A and riboflavin content of the diets, whereas families in Group B used this herb in trivial amounts for flavoring. No nutrient values were found for lemongrass, which was used regularly in substantial amounts for flavoring. Persons in Group B got a greater percentage of their calcium and iron from green than from other vegetables, whereas those in Group A obtained as much or more of these nutrients from other vegetables.

Nearly 3/5 of the ascorbic acid intake of Group A was provided by other vegetables as compared to 1/4 from green vegetables, whereas Group B obtained about equal amounts of ascorbic acid from green and other vegetables. Egg plants[1], calabash and white radish were most commonly used in quantity. Onion, garlic and dried chilies were used daily, but in smaller amounts. With the exception of one family which ate a large amount of sweet potato on one survey day, consumption of tubers, i.e. sweet potato and taro, was small and usually in the form of snacks eaten by children. Legumes were seldom eaten in Bang Chan. Two families had bean sprouts on survey days, and children occasionally ate mungbeans and peanuts as snacks,

Fruit. - Although technically a fruit, the coconut does not resemble fruits as a group in its contributions to the diet, hence coconut and other fruits are treated here as two sub-groups. Coconut meat, and its products, coconut milk and coconut cream (Appendix C, p.128), were used almost daily in the participating households. These coconut products contributed about 1/5 of the total fat of the diet, for Group A,

---

[244] [252] 1. Many varieties of eggplant are grown in Thailand. Three were used on survey days: the pea-size variety which was frequently put in hot curry, a round type which was served raw with chili sauce and a long variety which was either panned with a small amount of fat or used in curry.

146 more than fats and oils as such.
262

Bananas were grown by all families that participated in the study, but were eaten only occasionally, primarily as (263) snacks. Tamarind and lime were used often in small amounts in making sour curry and chili sauce, and bergamot rind was used for seasoning. Papaya and mango, both of which are good sources of vitamin A and C, were each eaten once only during the survey. The green papaya was used in curry. Fruits are relatively abundant in Thailand, the year round, yet fruit made minor contributions to the diets of families studied in Bang Chan.

Fats and oils. - Fats were used in small amounts to pan fish, meat, eggs and vegetables, and provided about 1/7 of the total fat in the diet of Group A, and 2/7 for Group B. Coconut oil, which was less expensive than pork fat, was more often used in Group A.

Sugar. - Palm sugar was used in small amounts in the preparation of many "with-rice" dishes, and occasionally in snacks, i.e. guava dipped in a mixture of sugar, salt, chili, mung beans cooked in palm syrup and the like. The amounts used were small, and the contribution to nutritive value was slight. By Western standards, the consumption of sugar in Bang Chan was almost negligible.

146 263 Spices. - Spices were commonly used in food preparation, particularly in hot dishes (i.e. those made with chilies) but little information on their nutritive value is available.

146 273 Alcoholic beverages. - In the families surveyed, all men except the elderly father in Household 21 drank occasionally, but most of the women did not. The husbands in Households 12 and 67 drank heavily at times. No estimate can be made of the contribution of alcoholic beverages to caloric intake in these households.

146 262 (128) Summary of Nutrient Contributions of Foods Commonly Eaten in Two Groups of Households. - The contribution in terms of calories and nutrients of certain foods used by 25% or more of the families studied, i.e. by 3 or more of the families on at least one survey day is shown in Table 13. Items selected for inclusion in this table are those which either made significant contributions to the nutrient content of the diets of Groups A and B respectively, or were major items in terms of amounts used or frequency of use. For certain items used frequently for seasoning, information on nutritive value was too scant to warrant inclusion in this table. Figures given are for average consumption per capita per day, based on all persons in the specified groups, and all survey days. For items used by all or most families every day, such as rice, fresh fish, chili, coconut products, and sugar, the figures represent approximately the usual daily per capita consumption.

Table 13. Contributions in Terms of Calories and Nutrients of Selected Foods Commonly[1] Eaten by Groups A and B

Foods	Frequency[1] of Use	Wt.	Calories	Protein	Fat	Carbohydrates	Ca	P	Fe	Vit. A	B1	Ribo.	Niacin	Vit. C
		Average values per person per day												
		gm		gm	gm	gm	mg	mg	mg	I.U.	mg	mg	mg	mg
Group A														
Rice		399	1440	28	3	316	28	634	3.5	(0)[2]	0.94	0.14	7.5	(0)
Eggs	9	4	8	1	1	0	3	8	0.1	48	0.01	0.01	0	0[2]
Fish, fresh	31	57	58	10	2	0	19	124	0.6	0	0.03	0.04	2.4	0
Fish, dried	8	6	12	3	0	0	4	2	0.2	0	0	0.02	0.2	0
Fish, fermented	2	2	2	0	0		19			0	0	0.01	0	
Fishsoy		5	2	0	0					0	0	0	0.1	
Shrimp paste	33	3	3	1	0					0	0	0	0.2	
Swamp cabbage	4	20	3	0	0	1	9	6	0.3	750	0.01	0.01	0.1	4
(2)Phag (2)ka-(2)cheed	4	3	1	0	0		6		0.1	204	0	0.01	0	2
Sweet basil		4	4	0	0	1	3	2	0.1	504		0.09		0
Calabash	3	11	2	0	0	0	1	2	0.1	8	0	0.01	0.1	1
Chili, fresh	17	4	1	0	0	0	0		0	126	0	0	0	8
Eggplants	10	13	3	0	0	1	2	5	0.1	4	0.01	0.01	0.1	1
Radish, white	5	7	2	0	0	0	0	6	0	1	0	0	0	1
Sweet potato	1	18	22	0	0	5	5	9	0.1	74	0.02	0.01	0.1	4
Banana	2	3	3	0	0	1	0	1	0	14	0	0	0	0
Coconut milk[3]	22	144	30	0	2	2								
Coconut oil		2	15	0	2	0	0	0	0	0	0	0	0	0
Lard		-	4	0	0	0	0	0	0	0	0	0	0	0
Sugar, palm		6	22	0	0	5	5	2	0.6	0			0	
Total			1637	43	10	332	104	799	5.8	1733	0.62	0.36	10.8	21
Total from all foods			1731	50	14	342	129	847	6.9	2047	0.68	0.37	11.3	27

See footnotes p. 76.

Table 13, cont.

Foods	Frequency[1] of Use	Wt.	Calories	Protein	Fat	Carbohydrates	Ca	P	Fe	Vit. A	B_1	Ribo.	Niacin.	Vit. C
		gm		gm	gm	gm	mg	mg	mg	I.U.	mg	mg	mg	mg
Group B														
Rice		438	1579	30	3	345	29	654	3.7	(0)	0.56	0.15	7.4	(0)
Glutinous rice		8	30	1	0	7	1	12	0.1	(0)	0.01	-	-	(0)
Eggs	7	5	9	1	1	0	3	10	0.1	58	0.01	0.01	0	0
Fish, fresh	32	72	75	13	2	0	25	158	0.7	0	0.04	0.05	3.0	0
Fish, dried	10	12	22	5	0	0	7		0.3	0	0.01	0.03	0.5	0
Fish, fermented	2	4	5	1	0		46			0	0	0.01	0	
Fishsoy		3	2	0	0					0	0	0	0.1	
Shrimp paste	28	2	3	1	0					0	0	0	0.1	
Swamp cabbage	5	9	2	0	-	1	6	4	0.2	542	0.01	0.01	0.1	3
(2)Phag (2)ka-(2)cheed	2	3	1	0	0	0	6		0.1	198	0	0.01	0	2
Calabash	1	10	2	0	0	0	1	2	0.1	7	0	0.01	0.1	1
Chili, fresh	8	3	0	0	0	0	0		0	48	0	0	0	6
Eggplants	3	5	1	0	0	0	1	2	0	2	0	0	0	0
Radish, white	2	12	3	0	0	0	4	3	0.1	3	0	0	0	2
Coconut milk[3]	16	76	52	1	4	3								
Coconut oil		3	27	0	3	0	0	0	0	0	0	0	0	0
Lard		3	30	0	3	0	0	0	0	0	0	0	0	0
Sugar, palm		11	43	0	0	11	9	4	1.3	0			0.1	
Total			1836	53	16	367	138	849	6.7	858	0.64	0.28	11.4	14
Total from all foods			2009	59	22	384	194	895	8.4	1340	0.76	0.23	11.5	23

1. All items were eaten by 25% or more of the participating families. Under "frequency of use," the number of times the item was used as a main ingredient of a "with-rice" dish is indicated for 24 survey days for Group A and 20 survey days for Group B.

2. ( ) means imputed value; 0 means none or insignificant amount; - means no values available, but probably contains measurable amount; blank space means that no information was found.

3. Different values were used for the calculation of nutrient content of coconut milk for Groups A and B (see Appendix C, pp. 128-129).

146 262 For items used less frequently, the figures are correspondingly less than the usual amount eaten. Thus, sweet potato, which is represented as 18 grams per day per person in Group A, actually appeared on 3 records only. One family of 8 persons ate 1200 grams of sweet potato at one meal and a substantial amount later the same day. Most items appear on the lists for both groups, but sweet potato, sweet basil and bananas were included on the list for Group A only, and glutinous rice which is used as a sweet in this area, appears on the list for Group B only. Note that a few common foods account for most of the nutrients in the diets of both groups. These common foods account for only about 80% of the calcium and vitamin A value and slightly less of the ascorbic acid in the diets of Group A. The list for Group B accounts for about 70% of the calcium and 60% of the ascorbic acid in the diets of this group. The variety of green leaves used once or twice only on survey days by Group B, and the number of different seasonal fruits used by both groups in small amounts as snacks, probably account for this.

264 [855] 262 Contribution of Snacks to the Nutrient Content of Diets. - On the average, 4 out of 5 children had one snack per day, whereas only one adult in 6 did so. The following items appeared most commonly: various kinds of fruit, 40 times (orange 7, banana 6, pineapple, watermelon and mango each 5 times, guava, jujube and Manila tamarind each 2 times, olives, rambutan, rambai, star gooseberry, (2)ta-(1)koo and Thai nutmeg each once,) coconut and bread each 13 times, glutinous rice 8, mung bean 7, truffles 6, products made of rice flour 6 times, and a variety of other items including rice noodles, sweet potato, taro, bean sprouts, lotus stalks, lotus seeds, popcorn, products made of cassava flour, sugar cane, pork and milk from 1 to 4 times each. Salt, and/or palm sugar were [146] eaten with a number of the snacks. Although they contributed only about 2% of the total calories, and from 1 to 3% of most nutrients, snacks contributed 16% of the total ascorbic acid for Group A and 11% for Group B.

Seasonal Variation in Food Preparation, Meal Patterns, Food Costs and Calorie and Nutrient Value of Foods Eaten

[128 252 264 435] In Table 14, a summary including the number of meals prepared, time spent in meal preparation, number of "with-rice" dishes, and cash expenditures for food is given by rounds, for families in each group.

252 512 Number of Meals Prepared. - Food was cooked twice on each survey day in 3 of 6 households in Group A and 3 of 5 households in Group B. Heavy farm work or vending which kept the mother away from the house sometimes accounted for once-a-day [443] food preparation. One housewife who took food to market in Bangkok, cooked food twice a day only during the period shortly before the birth of a child, when she was not vending.

[Text continues on page 79---Analyst]

Table 14. Summary Concerning Meal Preparation, by Rounds[1] for Two Groups of Households Studied

Description of Items	Group A				Group B			
	Round I	Round II	Round III	Round IV	Round I	Round II	Round III	Round IV
No. of meals prepared - 2	5	4	4	4	4	4	5	3
- 1	1	2	2	2	1	1	0	2
Range of cooking time, hrs.	0.8-6.0[2]	1.0-2.6	1.3-2.7	1.3-4.0	1.7-3.2	1.4-4.1	2.2-3.3	1.0-3.2
Average cooking time, hrs.	3.7	2.0	1.8	2.4	2.5	3.1	2.8	2.0
Range of no. of dishes prepared	2-8	2-5	1-4	1-4	2-5	2-7	2-6	2-5
Average no. of dishes prepared[3]	5	3	3	3	3	5	3	3
Range of no. of hot dishes	0-3	0-2	0-2	1-3	0-2	1-2	1-2	0-2
Average no. of hot dishes	1	1	1	2	1	2	1	1
Range of no. of mild dishes	2-7	0-3	0-3	0-3	1-3	1-5	1-4	1-3
Average no. of mild dishes	4	2	2	1	2	3	2	2
Range of cash expenditure for meals/day (bahts)[4]	1.53-4.45	0.61-6.30	0.12-4.52	0.66-2.88	0.71-16.24	1.07-11.86	1.12-4.13	0.45-3.47
Average cash expenditure for meals/day (bahts)	3.01	2.96	2.39	1.70	4.85	4.11	2.61	1.36

1. For dates, see Table 7, p. 58.

2. If time waiting for a vender was not counted, the range of cooking time would be 0.8-4.1 and the average would be 3.2 hours.

3. "With-rice" dishes only. Rice is always cooked whenever a Thai meal is prepared.

4. One baht was equal to 5 cents at the time of studies.

252 Another, who had time during Round IV to prepare food twice a
262 day, preferred to prepare more in the morning when she expected
264 to offer food to her son who had just been ordained. In two
512 instances an evening meal was not prepared because the father
[525] and mother had been invited to a feast in connection with an
ordination ceremony, on one occasion a mother did not prepare food because she was gambling. In all of these cases, the evening meal at home consisted of leftover rice and other foods prepared earlier. The housewife in Household 215 sometimes received cooked foods from visitors in return for her services as medium, and these were used, together with leftover foods, for the evening meal. The meal patterns of the two groups of families did not appear to differ greatly.

252 *Time for Meal Preparation and Number of Dishes Prepared*. - In general, the time for meal preparation varied with the number and type of "with-rice" dishes prepared. The "hot" dishes usually required more preparation time than the mild ones, because of the time required to pound spices, and to cut up ingredients. Once-a-day food preparation reduced the time required for cooking. More time was apt to be spent on food preparation when the housewife was least busy with farm work or other work outside the home. Some of the families visited early in Round I had not begun heavy farm work, and in some, children, who were less skilled, did the cooking.

262 *Cost of Food Purchased*. - The lowest cash expenditure
435 for food by any household on a survey day was 0.12 baht, for
511 a family in Group A, and the highest 16.24 bahts, for a household in Group B (Table 14, p. 78). On a per capita basis, however, the mean cash expenditure for food by Group A households, for all survey days, was slightly higher than for households in Group B (Table 8, p. 62), and no evidence was obtained that in general households in one group tended to spend more for food than households in the other. Despite the wide variation in cash expenditures for food on the survey days, the tendency for cash expenditures for food to decrease in both groups of households as the survey year pro-
262 gressed was apparent. Most of the rice was sold at the end
432 of Round III. The cash went for capital investments, not
[221] food, during Round IV. With time to drain ponds and to fish intensively, and with ceremonies to attend, people did not need to buy fish and meat which were relatively expensive.

146 *Calorie and Nutrient Value of Foods Eaten*. - The
221 seasonal variation in calorie and nutrient intake of the two groups of families is shown in Table 15. As one would expect,
[228] the average calorie intake was higher during Rounds I and III, when relatively heavy farm work associated with planting and harvesting was under way, than during Round II, which was primarily the growing season for rice, or Round IV, when the harvest was in, and the earth was dry so that preparation for the next planting had not yet begun. Greater consumption of rice in Rounds I and III was largely responsible for the

[Text continues on page 81 --- Analyst]

146
221

Table 15. Seasonal Variation in the Average per Capita Intake per Day of Calories and Nutrients by Two Groups of Households

	Family Group	Round[1]			
		I	II	III	IV
Calories	A	1906	1560	1752	1708
	B	2262	1757	2156	1862
Protein, gm	A	53	44	48	55
	B	59	49	59	68
Fat, gm	A	15	15	14	13
	B	25	21	19	21
Carbohydrate, gm	A	382	302	349	334
	B	437	334	427	340
Calcium, mg	A	239	84	86	107
	B	243	181	223	128
Phosphorus, mg	A	953	782	734	917
	B	1033	737	960	851
Iron, mg	A	9.0	6.4	5.6	6.6
	B	7.7	7.1	12.5	6.1
Vitamin A, I.U.	A	4414	582	1392	1802
	B	1337	1939	1197	884
Thiamine, mg	A	0.86	0.63	0.59	0.63
	B	0.92	0.57	0.72	0.57
Riboflavin, mg	A	0.61	0.27	0.34	0.24
	B	0.43	0.24	0.27	0.25
Niacin, mg	A	13.2	11.1	9.2	11.8
	B	14.1	9.2	11.7	11.2
Ascorbic acid, mg	A	48	19	21	18
	B	15	45	21	15

1. For dates of Rounds, see Table 7, p. 58.

146 221 higher calorie intake in these periods. In general, the level of calories, phosphorus and thiamine and to some extent the protein varied with the rice consumption. The greater consumption of fish when fish ponds were drained during Round IV, accounted for the relatively higher protein content of the diets of both groups at this time, even though calorie intake was not at its peak. During this period, animal foods provided 45 and 53% of the total protein intake of Groups A and B respectively, whereas for the year as a whole, 37 and 40% of the protein intake of these groups was of animal origin.

The relatively high vitamin A and C intakes of families in Group A, during Round I as compared to other periods, was associated with a higher consumption of green leafy vegetables, and the use of sweet potatoes in quantity by one family. During Round II, families in Group A had few green vegetables, and their average intake of vitamin A was very low. The use of papaya, obtained as a gift, by one family in Group B during Round II raised the average ascorbic acid intake for this group substantially. Better average intakes, by one or both groups, of vitamin A, thiamine, riboflavin and calcium during the first Round, were not such as to provide liberal body stores to be called upon when food supplies of these nutrients were low.

000 SOME RECOMMENDATIONS FOR IMPROVEMENT OF DIET AND NUTRITURE AMONG RESIDENTS OF BANG CHAN

[164] Attempts to improve nutritional status in Bang Chan should be directed both toward increasing the supply and intake of certain nutrients and toward improvement of sanitary conditions so that intestinal infestation, diarrhea and other related illnesses will not lead to needless loss or increased requirement of nutrients.

Solution of the related problems of disposal of human
excreta and provision of a year-round safe water supply are
[164] in the province of the sanitary engineer. Intestinal para-
[312] sitism was common, but little can be done through treatment
of individuals so long as the water supply is contaminated.
[271] Rain water was preferred for drinking, so provision of ade-
quate and sanitary storage for rain water, coupled with
sterilization of water from ponds and canals when rain water
is not available, would do much to ensure safe drinking
[840] water. The custom of giving mother and infant boiled water
[353] only, during the post-partum rest period, provides a start-
ing point for extending use of boiled water to other ages
and conditions.

000 [35[illegible]] and conditions. An improved stove[1], by making more efficient use of fuel, would reduce one obstacle to boiling drinking water. The alternative, chemical treatment, might be regarded as "medicine," and people might be more willing to spend money for this than for firewood. Water supply and latrine facilities at the school and wat should be such as to set a good example. Since links between sanitation and health have not been established in the minds of the villagers, no proposed solutions are apt to be effective without a strenuous and continued educational campaign.

Since the nutrient content of many foods used in Bang Chan has not been ascertained, the responsible Thai government personnel should as soon as possible seek to analyze those more commonly used, in particular fish, fermented fish, shrimp paste, fish paste and fishsoy, both commercial and home-made products, edible green leaves and flowers. Discovery, among the many varieties of fish used, of some which are good sources
146 of vitamin A, would be particularly useful. Of the calculated vitamin A values in diets for the two groups of households studied 90% or more of the vitamin A value was from vegetable sources, therefore in the precursor form. Among foods of animal origin which were used, eggs were the only food known to contain appreciable amounts of vitamin A. With more, and more complete, analyses of Thai foods, some of unusual nutritive value would probably be discovered. Also, information on composition of coconut milk should permit reasonably accurate calculation if the weight of coconut meat and the resulting product are known. Use of figures now available in food value tables, for coconut milks as prepared in Bang Chan, would lead to gross overestimate of caloric value and fat content of diets.

000 In using present knowledge to improve nutrient intake, emphasis should be placed on changes which would improve the everyday diet for all members of the family. We would start with familiar foods and methods of preparation, stressing the types of food which should be produced and used in increasing amounts. Advice of specialists in agriculture at nearby Kasetsart University should be sought in making choices appropriate to the location, among vegetables which would enhance the nutrient content of the diet, particularly in vitamin A value
[244] and riboflavin. Since garden area is often limited, vine vegetables which can be trellised may be useful. In introducing innovations, we would, if possible, build on procedures known to be acceptable to some respected persons in the community.

---

1. The "Hyderabad Smokeless Chula" would be useful in Bang Chan. In Smokeless Kitchens for the Millions, S. P. Raju (1953) includes designs for models with one to three cooking holes and hot water pot (The Christian Literature Society, P. O. Box 501, Park Town, Madras, India).

000 First steps toward a better diet are suggested by the best dietary practices observed. Although the calculated intake of no family on any survey day approximated or exceeded the estimated allowances for all nutrients, sharp contrasts were evident in individual records. Two sample calculations in Appendix C (pp. 121-122) represent one of the better and 262 one of the poorer records obtained. The food for Household 532 12, on Jan. 14, 1954 consisted chiefly of polished rice, fish, and non-leafy vegetable, with seasonings. In contrast, on July 23, 1953, Household 16 used home-milled rice, and about 60 gm. per person of swamp cabbage, with other vegetables and fish. These choices enhanced the potential nutritive value of the diet markedly without increasing its cash cost. Family labor was involved, however, in gathering greens and milling rice.

000 Since rice is the chief solid food for all ages, improving this major item will be considered first. An important step would be to teach the people to cook rice with just enough water so that all would be absorbed. The Thai government [252] has sought to encourage this. So long as the practice [146] of cooking rice in excess water persists, much of its vitamin and mineral content will be discarded, and efforts to improve the nutrient content of rice will be largely nullified. Some rice water could be used as a beverage, and for cooking certain vegetables which are commonly served with a thickened sauce. This would be preferable to discarding the rice water, but encouraging its use must be considered as an alternative to cooking rice without excess water, since the two practices are mutually exclusive.

[146] [256 Use of under-milled and processed rice, and of the rice polishings, has the advantage that a large part of the original B-complex content is conserved, whereas vitamins for enrichment are at present imported, and are apt to be for years to come. Since home milling persisted to some extent in Bang Chan, it might be encouraged, in some families. [256] [554] One highly respected headman continued to mill rice at home, hence the "prestige value" of white rice may not be so important in Bang Chan as it is among city Thai, who sometimes regard undermilled rice as "prisoner's food." The time and effort involved in home milling, however, may deter those who have given it up from returning to it; and since deepening the main canal has made the mill accessible to more families the year round, a program based on the assumption that commercial milling of rice will increase is probably more realistic than an attempt to encourage the return to home milling where it has been abandoned.

256 At present, no processed rice is made in Thailand. A plan to buy and install a Malekizing plant to process rice for the Royal Thai Navy was announced in 1953, but the plan has not materialized. Enriched rice has been sold by the Thai Rice Company for some years, but the best grades only,

256 90 to 100% unbroken grains, are used. To benefit rice farmers, enrichment should either be done at the nearby mills, or premix sold locally, and farmers taught to mix it with
[146] their own rice. Because the premix used and marketed by the Thai Rice Company contains riboflavin as well as thiamine, niacin and iron, the treated grains can be readily distinguished
000 from ordinary rice. Enrichment at the mill would be convenient, but would probably entail some government supervision and would not automatically ensure a better nutrient intake unless people learned the value of the conspicuous yellow grains. From this standpoint, separate purchase of premix might have advantage, at least in the initial stages of the program.

As far as we know, use of rice polishings in preparing "with-rice" dishes has not been explored in Thailand. Incorporation of rice polishings into a variety of soups and other "with-rice" dishes which would be acceptable to the Thai palate should not be difficult for the Thai home economist interested in experimental cookery. Nutrients usually lost in milling could thus be returned to the human diet. If adopted this procedure could be effective even in families that cling to the customary method of cooking rice in excess water. One old lady with beriberi, whose doctor had prescribed rice polishings, said she found them tasty. Information on the health value of rice polishings would probably be received more favorably if homemakers were shown acceptable ways of using them. A watery extract of the polishings might be used as a stop-gap preventive of thiamine deficiency while the slow process of changing food habits is going on. Such an extract could be used as a strengthening medicine for women during pregnancy and lactation, for infants and young children, and for those doing heavy field work, i.e. for vulnerable
[759] groups. The "second class doctors" at Minburi, the priests who practice healing, other traditional practitioners and midwives, because of their basic desire to help, would provide natural centers of information for this purpose.

Efforts being made by Thai government agencies to encourage eating more "with-rice" and less rice should be continued. A Thai co-worker suggested that "an educational program enjoining less peppery forms of with-rice would have the effect of encouraging consumption of a larger proportion
[262] of with-rice" (Sharp et al. 1953, p. 278). Various food items including those with a hot taste, were sometimes said to be bad for children, pregnant women, sick persons, etc., but seldom was any food mentioned as being good to eat under these circumstances. The concept that hot tasting foods are not healthful might be coupled with the idea that more generous amounts of mild dishes, especially those including green and
[262] yellow vegetables, should be used instead. The most widely used vegetables in Bang Chan were the wild swamp cabbage, and (2)phag (2)ka-(2)cheed, both leafy aquatic plants. Planting more (2)phag (2)ka-(2)cheed, and liberal use of both of these plants while they are available should be encouraged.

1

000 Growing other kinds of green and yellow vegetables
should be fostered. Although vitamin A value and riboflavin
content appear to be critical, in choosing vegetables to be
stressed, specialists in agriculture should consider greens
[262] with high calcium and low oxalic acid content also. A
variety of edible leaves of trees were used by a few families;
some used sweet basil as a vegetable rather than just
a seasoning; pumpkin and sweet potato were familiar, but
less often used than would be desirable. More green or
yellow vegetables which mature when canals are low and
aquatic plants no longer available, would be especially good.
If increased production by most households[1] is not practicable,
a few of the more successful gardeners might be
persuaded to produce vegetables and fruits which would help
to bridge the gap between rainy seasons. Mushrooms, which
can be grown readily, would provide a good source of riboflavin
[264] when leafy vegetables are in short supply. The boom-and-bust
experience in mushroom culture (See Appendix A,
pp. 101-102) might, however, make its revival as a source of
healthful food for home use more difficult than if the
villagers did not think of mushrooms as a cash crop for
which the market failed.

Eating more fruit would help to tide over the dry
262 season. Fruits were commonly used as snacks, not at mealtime,
[264] hence snacks of fruit should be encouraged for adults
as well as children. Bananas grew in all gardens and were
available the year round. The (4)nam (4)waa variety, which
was used in ceremonies, and considered safe for all, should
000 be stressed. More families could grow pineapple, which is
[777] relished both raw and in curries. Mango and papaya, fruits
of outstanding value for both vitamin A and ascorbic acid,
would be excellent, but the idea that growing papayas is
"unlucky" must be taken into account. If a few of the more
thoughtful and forward-looking farmers could be persuaded to
start papaya trees, even though they were not willing to
plant them near the house, the practice might spread in time.

146 On the average, the Bang Chan diet did not seem to be
[164] very deficient in protein, but distribution is not proportional
to need, and protein deficiency may be in part responsible
for periods of weight loss, or failure to gain, so
000 common among infants and children. The presence of other
[136] essential nutrients in animal foods is important also. If,
the local supply of fish is indeed diminishing, efforts to
[228] increase it through pond culture should be continued. Abandonment
of tilapia culture in Bang Chan, after about one-third
of the families had tried it, (Appendix A, p. 101)
suggests that not enough of the right kind of help was given

---

[1] Tenant farmers may not be permitted to enlarge gardens by mounding at the expense of rice fields.

000 concerning its culture and use. Tilapia culture was learned
[illegible] largely by trial and error, and was considered primarily as a
[224] source of extra cash. If it had been regarded also as a means of improving health through increasing the family's food supply, and if the homemaker had been shown how to use this unfamiliar fish in familiar ways, the outcome might have been
[262] different. Increased use of fermented fish and of small dried fish which are eaten whole, should be encouraged. So long as the ability of human beings to adapt to such low calcium intakes without harm has not been proved, any feasible means of increasing the calcium content of the diet seems worth trying.

262 More home consumption of eggs would be desirable, but
[432] their ready sale and acceptability for barter may present an
[illegible] obstacle to increased home use. Increased production would probably lead to some increased home use at least at the peak
[432] season. Duck eggs which are less often sold, might be stressed both for this reason, and because of their greater size. The idea held by some that eggs are not good for children nor for pregnant women should be countered when possible. Since hard cooked eggs have many ceremonial uses, they might be presented
[264] as "strengthening" food. Hard cooked eggs, which could be prepared the night before, would be convenient as breakfast for workers who would otherwise go to the field without food, for lunch to be carried to the field or to school, and for occasions when parents are to be away from home, as at a ceremonial, and should leave food at home for children.

272 Milk, as canned, dried or malted milk preparations, was
[793] considered an appropriate gift for the priests, who are forbidden to eat solid food after the 11 a.m. meal. Some of this
[789] may be shared with the temple boys. The respected old ladies and others who stay overnight at the temple on the Buddhist holy day, and who observe the same rules as the priests for this time, also like to drink milk, often with coffee. Perhaps the wat committee could be taught how dried or canned milk should be reconstituted, and could direct that this be done. They could both spend some of the cash offerings for milk and encourage those who buy gifts of food for the priests to in-
000 clude milk among them. People gladly bought food for the
[829] priests and would probably accept on the authority of the head
[792] priest or respected elders, the idea of buying certain foods of high nutritive value, even though these cost more. If a small group of leaders, such as the wat committee or the hamlet headmen were instructed in the dangers of contaminated water and the values of good food, with the implication that the best available should be offered the priests both daily, and on ceremonial occasions, improved practices might spread to home consumption, since most food is prepared in the home.

[796] The importance of merit making and the relatively large
[782] cash expenditures involved in ceremonials, will probably influence acceptance of any improved practices which involve cash outlay. If some leaders were interested in dietary

000improvement, (l)ngaan sponsored by them might serve to acquaint a large group with a new practice. Suppose, for example, that addition of premix to rice, and cooking rice without excess water were being promoted. If one of the respected priest-practitioners could be persuaded to introduce these practices at his homage-to-the-teacher rite and give them some publicity, this might help to create a favorable attitude toward the suggested change.

Every change will require continuing education, and a variety of approaches should be used, some of which have been [872]mentioned. If the elementary school teachers were persuaded of the importance of a good diet and improvement in sanitation, and had a sound understanding of the desired changes in practice, they could influence both the oncoming generation, and their neighbors through teaching and example. Continued practical health education for school children should ultimately bear fruit. The value of eating more green leafy vegetables should be taught, and the children could learn about leafy greens available in the village, but not widely used at present. Good foods to bring to school for lunch might be stressed. Hard cooked eggs have already been mentioned. If convenience as well as health value were stressed, this might lead in time to increased consumption of eggs by growing children, and ultimately by adults as well. If a simple school lunch program were organized, either on a cooperative basis or subsidized, the inclusion of peanuts would help to increase both the protein and the thiamine content of the children's diets. Though unfamiliar to many of the children, lightly roasted peanuts were enjoyed as a treat offered at the end of the medical inspection. If teachers could influence venders to prepare and sell more of the snacks which would be desirable additions to the children's food, this would be a gain. Fruit could be stressed for school lunch. At any time of year, a banana a day for each child would probably be possible, and bananas should be emphasized even though their nutritive value is not so outstanding as that of many other fruits. Values of other fruit in season should be taught. The school garden could be used to demonstrate how to grow some of the more nutritious vegetables. Awards for those with the best home gardens could be used to stimulate improvement. Similarly, recognition for improvement in home sanitation might be useful.

In adult discussion groups, both men and women should learn about good food and health practices. The slack period between transplanting and harvest, when people can get about easily by boat, would be the best time for such meet-
[212]ings. Since many adults in Bang Chan were illiterate or did not read with ease, very simple teaching material is needed. Association between good food and health must be built up gradually. Appeal to economic and other motives may be used where such motives reinforce the desired ends. The extension
[871]method of adult education, just in its beginnings in Thailand,

000 [871] offers a means of teaching local leaders who in turn could teach neighborhood groups.

Where alternative solutions are being considered, a well designed experimental program would help to decide which would be more acceptable. Teachers and advanced home economic students at nearby Kasetsart University might plan and execute such an experiment on a small scale. Thus, after learning in the laboratory how to include rice polishings in some common "with-rice" dishes, this might be taught to people in one village. In another, addition of premix to milled rice at home, and cooking rice without excess water, could be taught. In both, the health values of undermilled rice could be stressed and the need to keep or to restore these if white rice is used. A followup should be made to see how many have tried, and how many have adopted the proposed change. Experience in pilot projects under the Thailand-UNESCO Fundamental Education Project (TUFEC) should provide clues as to methods likely to be successful. In Bang Chan, where frank deficiency disease is uncommon, improvements in health and nutriture may not seem spectacular. Improving nutrition, which implies changing attitudes, food habits, agricultural and sanitary practices, must be seen as a long term goal, requiring continuing education.

REFERENCES CITED

113 Anantakrishnan, C. P., Bhalerao, V. R. and Venkatappiah, O. 1949 Component acids of coconut oil. Indian J. Veterinary Science 19:233-236. (Cited in Nutrition Abstracts and Reviews 1950-51, 20:846).

Bunnag, Capt. C. V. and Dhararak, V. August, 1947 Climate of Siam. Royal Siamese Navy, Meteorological Dept., Scientific Article No. 4. Bangkok, Thailand.

Chutima, Y. H. 1939 Siam: Height and Weight of Population with Comments on Diets. Siam Science Bulletin No. 3. Public Health number.

Food and Agriculture Organization of the United Nations. 1948 Rice and Rice Diets. FAO Nutritional Studies No. 1, pp. 71.

Food and Agriculture Organization of the United Nations. 1950 Calorie Requirements. Report of the Committee on Calorie Requirements. Washington, D. C., U.S.A. pp. 12-16 September, 1949.

Food and Drug Division. Department of Health. 1953 Tables showing food values for calculation of diet records. J. Medical Association of Thailand, Special Number, September.

Food and Nutrition Board, National Research Council. Recommended Dietary Allowances. Revised 1953. National Research Council Publication 302.

Goldsen, R. K. and Ralis, M. 1957 Factors Related to Acceptance of Innovations in Bang Chan, Thailand. Analysis of a Survey Conducted by the Cornell Cross-Cultural Methodology Project, May 1955. Cornell Thailand Project, Interim Reports Series, Number Three. Data Paper: Number 25 Southeast Asia Program. Dept. of Far Eastern Studies, Cornell University, Ithaca, New York. viii, pp. 72.

Grant, M. W. 1948 Technique for the Dietary Section of a Nutrition Survey. Memorandum issued by the Applied Nutrition Unit, London School of Hygiene and Tropical Medicine (University of London), Keppel Street (Gower Street), W. C. 1. Mimeo. pp. 39.

Hauck, H. M. 1953 Kitchens in Thailand, and a Thai picnic. See Foreign Flavor, J. American Dietetic Association 29:276 and 278.

113 Hauck, H. M. 1956 Aspects of Health, Sanitation and Nutritional Status in a Siamese Rice Village. Studies in Bang Chan 1952-54. Cornell Thailand Project, Interim Reports Series, Number Two. Data Paper: Number 22 Southeast Asia Program. Dept. of Far Eastern Studies, Cornell University, Ithaca, New York. ix, pp. 73.

Janlekha, K. 1955 A Study of the Economy of a Rice Growing Village in Central Thailand. Thesis for the Ph.D. degree, Cornell University.

Knudson, A. 1955 Letter to the Editor Nutrition Reviews 13:191.

Leung, W. W., Pecot, R. K. and Watt, B. K. 1952 Composition of Foods Used in Far Eastern Countries. Agriculture Handbook No. 34, United States Department of Agriculture, Washington, D. C.

Losee, F. L. 1952 Results of a year's research on dental caries in American Samoa, 1950. J. Am. Acad. of Applied Nutrition 5:258-265.

Miller, C. D., Gegore, K. and Robbins, R. C. 1936 Some Fruits of Hawaii. Their Composition, Nutritive Value and Use. Bulletin No. 77. Hawaii Agricultural Experiment Station, Honolulu, Hawaii.

Nicholls, L. Tropical Nutrition and Dietetics. London, Balliere, Tindall and Cox. ix, pp. 476, 3rd ed. 1951.

Sharp, L., Hauck, H. M., Janlekha, K. and Textor, R. B. Siamese Rice Village. A Preliminary Study of Bang Chan 1948-1949. Cornell Research Center, Bangkok, Thailand. xii, pp. 300. 1953.

Sharp, L., Moore, F. J. and Vella, W. F., Editors. 1956 Handbook on Thailand. Preliminary Edition. Subcontractors' Monograph HRAF-42 Cornell-4 xii, pp. 568.

Sudsaneh, S. 1956 A Study of Food Consumption and Nutrient Intakes in Relation to Physical Findings for Eleven Selected Thai Families, Bang Chan. Thesis for the M.S. degree, Cornell University.

Sudsaneh, S., Campbell, M. B. and Hauck, H. M. 1954 Compilation of Food Values from Various Sources for Use with Data from Thailand. Ditto, p. 10.

Suvarnakich, K. 1950 The Thai diet. Nutrition Reviews 8:289-291. (In slightly fuller form in Harvard Public Health Alumni Bulletin. 1950, 7, no. 2, p. 3-7.)

113 Thorangkul, D. 1957 An Analysis of Heights and Weights of Thai School Children in Bang Chan with Comments on Their Diets. Thesis for the M.S. degree, Cornell University.

Tmangraksatve, S. and Srisukh, S. 1955 Thiamine in Thai rice. J. Pharmaceutical Association of Thailand 8(4):8-23.

115

SOURCES OF NUTRIENT VALUES FOR FOODS USED IN BANG CHAN

Agrupis, F. M. 1953 The value of water hyacinth as silage. The Philippines Agriculturist 37:50-55.

Aykroyd, W. R., Patwardhan, V. N. and Ranganathan, S. 1951 The Nutritive Value of Indian Foods and the Planning of Satisfactory Diets. Health Bulletin No. 23, 4th ed., Revised. Manager of Publications, Delhi.

Bocobo, D. L. et al. 1951 Food Composition Tables Recommended for Use in the Philippines. Institute of Nutrition, Department of Health, Republic of the Philippines. Handbook No. 1.

Chandrapanond, A. 1955 BE 2498. Food consumption of Thai people. J. Medical Association of Thailand 38:111-159.

Chatfield, C. 1954 Food Composition Tables - Minerals and Vitamins. For International Use. FAO Nutritional Studies No. 11.

Knudson, A. 1955 Letter to the Editor. Nutrition Reviews 13:191.

Leung, W. W., Pecot, R. K. and Watt, B. K. 1952 Composition of Foods Used in Far Eastern Countries. Agriculture Handbook No. 34. United States Department of Agriculture, Washington, D. C.

Nicholls, L. 1951 Tropical Nutrition and Dietetics. London, Balliere, Tindall and Cox. ix, pp. 476, 3rd ed. 1951.

Platt, B. S. 1945 Tables of Representative Values of Foods Commonly Used in Tropical Countries. Med. Res. Council Special Report Series No. 253.

Watt, B. K. and Merrill, A. L. 1950 Composition of Foods - Raw, Processed, Prepared. Agriculture Handbook No. 8. United States Department of Agriculture, Washington, D. C.

Willimott, S. G. 1949 Malayan Food Composition Table. Scientific Series No. 23. Department of Agriculture, Federation of Malaya.

APPENDIX A

Description of the Kitchen and Some Notes on Food Preparation in a Relatively Prosperous Household[1]

Friday, May 22, 1953

177 [illegible] Arrived at 5:15 a.m. When we reached the house, the mother was holding the dog. The house was dark, and we walked around sleeping babies and children. . . . . The 15 year old niece who prepares meals here, was already at work. For light she had an oil lamp, a tin of about 1 pt. capacity, with wick. The rice was already measured, but she waited until SS could weigh it, before putting it on to cook. SS used her flashlight to see the scale and her notebook.

[illegible] The kitchen here has a thatched roof, well smoked, but the walls and "windows" are of woven split bamboo. A sliding wooden "window" can be pushed back to allow access to a broad shelf outside. Here a large pan of pond water is kept, so that dishes may be rinsed and hands rinsed after each operation. Dishes are stacked upside down, on a wooden rack nearby, to dry.

117 [illegible] The stove area in the corner has place for one fire, but several places for pots to stand. Downstairs, under the shed near the fish pond, is a larger clay stove, where the niece cooks the rice in the morning (enough for noon as well) and some other items; for example the (3)khii-(2)leg leaves which were cooked last night for use in sour curry this a.m. This probably keeps the kitchen cooler than it would otherwise be. Waste, fish bones, vegetable parings, etc., which are to be given to the chickens, can be thrown below through the space between two floor levels (kitchen and main rooms).

[23] Rice water, coconut water, and food left in the serving bowls when the meal is over, are given to the dogs. A bowl is kept below, near where rice is drained, for dog food. Food left in pots is kept for humans to eat.

117 [illegible] Fish caught in the pond are kept alive in pond water, in a water jar. When a fish is wanted, the niece catches one from the jar, stuns it with the back of her knife, and scales and cleans it on a split log nearby (rounded side of log up). The fish is put into a small basket, and the niece

---

[1] In reproducing these notes, slight changes have been made such as substitution of descriptive terms for personal names which appeared in the original.

117 takes it down the steps to the fish pond, where she swishes
252 the basket around to wash the fish, and rinses her hands at
the same time.

[294] There are some hazards to the food--chickens trying to get at the edible part of fish while the niece cleans it (she leaves the scales, etc. for them to eat); cat and kittens in the kitchen, having to be driven away from the grated coconut and coconut milk, and getting an occasional unweighed nip. Whether we start to weigh food for the evening meal or a.m. meal, some cooked foods are apt to be used, either left over
[illegible] from a previous meal, or cooked in advance. This a.m., for
[illegible] example, buffalo meat, already cooked (but not weighed before cooking) was used, and (3)khii-(2)leg leaves, which SS weighed last night. These latter were cooked last night, to reduce bitterness, then put into curry today.

Description of Food Preparation Area in a Relatively Poor Household

Wednesday, May 27, 1953

117 Arrived about 5:45 a.m. While other food was being pre-
[illegible] pared, the 11-year old son came in with a package of salted white radish and a small milk tin with some coconut oil which had just been bought. This is the house which we found flooded when they sent for us to see the baby last fall. The roof seems to be well thatched. The floor is not wet after last
[35?] night's downpour. The bed platform, in one corner, is about
[illegible] 8 x 10 feet. The baby's cradle hangs above it. In the oppo-
[35?] site corner is a shelf where utensils are kept. Some food,
[illegible] in paper bags, is in a basket hung from the roof. Fresh fish
[354] is kept in a jar of water until needed. The stove is on a small mound of earth, and further elevated on a small box (just big enough for the stove) filled with earth.

[35?] We sit on a mat, spread on the mud floor, with the scales, plastic bowls and waxed paper ready for weighing food.
[35?] The children lie on a mat nearby. In the house is a fresh mound of earth, a small straw bin with rice, and various pieces of equipment.

Notes on Meal Service

In a Relatively Prosperous Household

Friday, May 22, 1953

117
262 Before breakfast is served, the six-year old girl comes with a piece of jack fruit. SS weighs it and tells her to bring back what she does not eat. Later she comes with hands [264] full of stones (14 of them). She has eaten this much as a "snack" before the regular meal. The grandmother finishes [illegible] the piece (7 stones) and gives the rind to SS to weigh.

[264] At breakfast the family sits in a circle on the kitchen floor. Each person except the baby has his own bowl of rice before him. In the center of the circle, within reach of all, are four small dishes of "with-rice" which has been prepared for breakfast: sour curry of buffalo meat, curry of (3)khii-(2)leg leaves, bean sprouts and one small fried fish. [853] The mother takes a very small bit of fish on a spoon with rice, and feeds baby. During breakfast baby has 6 bites of [855] rice with fish, nine small spoonfuls of rice with sour curry. The mother herself eats one bite of fish. She takes four spoonfuls of sour curry on plate with rice. This is shared with baby. Mother and baby eat mainly rice, fish and sour curry of buffalo meat, whereas grandmother and the six-year old girl have curry of (3)khii-(2)leg leaves and bean sprouts with their rice.

117
853
[559]

In a Relatively Poor Household

Wednesday, May 27, 1953

While the mother finishes the meal preparation, the seven-year old girl feeds the baby, first rice with some chopped egg, then rice with the "water" from the egg. The mother remarks that she cannot cook unless someone looks after the baby.

117
264 Technique of eating -- A tray with the "with-rice" is set out, also a bowl with water, for rinsing the hand, and a basin or bowl with drinking water. There are spoons in the "with-rice," but these seem to be used for taking some of the juice, which may be eaten directly or put on the individual's bowl of rice. Solid pieces are taken from the serving dish by hand, and mixed with some of the rice, which is then picked up in the right hand. Occasionally the person eating will rinse his hand with water. When finished, each person rinses his bowl (using either water from the bowl nearby, or from the general supply -- in this case the canal). Dishes are turned upside down on the platform near the stove, to dry.

Equipment Used For Food Preparation

252 41 [251] Equipment used for food preparation by 11 families participating in the dietary study: clay stove; pots and covers of clay, light weight aluminum, and enameled iron; frying pans, curved, of sheet iron, with home-made wooden handle on one side, or metal handles on opposite sides (shallow clay pans were also used for frying); basins, pails, chopping boards; grater for coconut: a metal, toothed instrument mounted on one end of a low wooden stool (often called a "wooden rabbit" because the seat of the stool might be shaped like a rabbit); mortar of pottery or stone; wooden pestle; fiber strainers usually with rigid handles, to hold them in place on top of a pot; a large-bladed all-purpose knife; in some households, one or more smaller knives; metal turner, with home-made wooden handle; spoons, with bowls of coconut shell, gourd or wood; tin cans for dipping, measuring rice, etc.; fiber trays used for winnowing rice, for drying food, storing dried chilies, onions, etc.; metal tray for serving food to priests, and for household use; baskets for storing food; (5)faa-(1)chii, or fiber cover, to keep flies and insects off cooked food; large earthenware water jars.

[184] Other items less often used, and owned by relatively few families in Bang Chan, included: steamer; a perforated clay pot or metal pan with cover, designed to fit tightly into another pot in which water was boiled; large wooden mortar, made of a hollowed tree trunk; spring-type egg beater (a strong spiral spring attached to a stick); scale; glass water jars.

Equipment Used in Serving Food and Eating

264 412 415 The equipment for serving and eating food might include: flat bottomed bowls with a deep edge, similar to Western-style soup plates, used as individual rice bowls; plates; small bowls for "with-rice" dishes; sauce dishes with stand, for chili sauce; enameled iron or china spoons (Chinese type) used for serving moist foods; forks, used by some families on special occasions;[1] teapot and cups; large rice bowl for ceremonial use (silver or aluminum); large brass spoon with serpent-tail handle, for serving rice; drinking glasses; tiered lunch pail; canteen; thermos bottle.

---

[1] A relatively poor family (Sharp et al. 1953, p. 223) had one pair of fork and spoon for eating.

Examples of Notes on Food Eaten by Individuals

117
262
264 Household 16 July 23, 1953

Family members observed at meal-time: All, as they ate breakfast at various times.

Notes re kind and amount of food eaten:

Breakfast: Girl aged 12 and boy aged 7 start eating at 7:20 a.m. Each one has one dish of rice and stew of swamp cabbage and salt fish for breakfast. They are through eating at 7:40 a.m.

9:10-9:30 a.m. Father eats two dishes of rice with stew and mother does also.

10:10-10:20 a.m. Son, 18 yrs. old, returns home and eats two dishes of rice mixed with stew.

10:40-11:00 a.m. Sons aged 25 and 20 have breakfast. The older one eats two dishes of rice but the younger one eats three.

11:30 a.m. Daughter aged 22 has two dishes of rice and stew. She is through eating at 11:45 a.m.

Household 67 May 26, 1953

Family members observed at meal-time: Mother and children.

117 Notes re kind and amount of food eaten:
262

Dinner: Girl aged 7 seems to be fond of fish but dislikes vegetables. Boy aged 11 likes to eat the vegetables from the curry. Each one eats two dishes of rice mixed with small amount of hot curry (5:02-5:17 p.m.)

[855] One year old baby is fed by his older sister, eating two spoonfuls of rice mixed with boiled coconut milk. Whenever he refuses to eat, his mother nurses him.

5:40-5:55 p.m. Mother eats 3 dishes of rice with 2 dishes of hot curry, containing a small amount of fish.

Father begins eating at dark so we can't see him.

Examples of Diet Records Submitted by School Children

Date	Breakfast	Lunch	Dinner	Snack
	Diet Record[1] of 10-year Old Girl: Diet Class I[2]			
May 19, '53	Sour curry of (2)phag (2)ka-(2)cheed Curry of swamp cabbage Boiled vegetables Fried mushrooms Roasted pilot fish Chili sauce		Cooked fish (sour) (2)phag (2)ka-(2)cheed Chili sauce	Star gooseberry Jack fruit seeds Fruit of egg tree Sweet made of flour, sugar, coconut milk Sweet made of flour, sugar, sugar palm
July 7, '53	Curry of (2)phag (2)ka-(2)cheed Boiled swamp cabbage	Boiled fish Boiled fermented fish	Boiled egg Roasted fish	(1)lam-(1)jaj (Fruit of Euphoria longana) Jack fruit seeds Sweet made of flour and sugar
Sept. 13, '53	Cooked climbing perch and other fish (sour)	Fried towel gourd with pork Fried serpent-head	Boiled climbing perch and silurus	Sweet made of flour, sugar and coconut milk Hog plum
Oct. 29, '53	Sour curry of katurai flowers with (2)phag (2)ka-(2)cheed Fried pork with swamp cabbage	Hot curry of serpenthead (2)phag (2)ka-(2)cheed Chili sauce	Sour curry of lotus stalks	Jack fruit seeds Fried banana Jambean

Examples of Diet Records Submitted by School Children (cont.)

Date	Breakfast	Lunch	Dinner	Snack
Nov. 25, '53	Curry of lotus stalks Fried salted fish (2)phag (2)ka-(2)cheed Chili sauce	Curry of swamp cabbage Fried salted fish	Roasted salted fish Curry of (2)phag (2)ka-(2)cheed	Orange Fried banana Sweet made of flour, sugar, coconut and corn Sweet made of flour, sugar, egg and coconut
Jan. 30, '54	Sour curry of (2)phag (2)ka-(2)cheed with katurai flowers	Sour curry of green papaya	Fried sweetened fish	Jack fruit seeds Rice flour chips Sweet made of flour, sugar, coconut, corn
June 4, '54	Fried fermented fish Curry of egg plant Cooked salted pork	Fried egg Salted crabs	Curry of pineapple Curry of chicken Curry of bamboo shoots	Star gooseberry Ice Sweet made of flour, sugar and coconut milk Sweet made of flour, sugar and coconut
	Diet Record of 12-year Old Girl: Diet Class III			
Feb. 14, '53	Hot curry of fish Fried dried meat with sugar		Sour curry of swamp cabbage	Sweet made of rice, banana and coconut milk
July 7, '53	Curry of chicken		Curry of white gourd	Longan

Examples of Diet Records Submitted by School Children (cont.)

Date	Breakfast	Lunch	Dinner	Snack
Sept. 13, '53	Curry of (3)khii-(2)leg		Curry of chicken	Fried sweet potato Star gooseberry Hog plum
Oct. -- '53	Sour curry of green papaya Fried swamp cabbage		Hot curry of fish	Guava Sweet made of dried beans and sugar
Nov. 28, '53	Fried Chinese noodles Boiled vegetables Chili sauce		Fried fish Boiled vegetables Chili sauce	Fried banana Fried Chinese noodles Sweet made of rice, banana and coconut milk
Jan. 30, '54	Beef curry		Sour curry of swamp cabbage	Chinese cake Jujube Sweet made of flour, sugar, coconut and corn Sweet made of dried beans and sugar

1. "With-rice" dishes only are listed for breakfast, lunch and dinner.

2. Adapted from Thorangkul (1957).

Notes on Tilapia Culture in Bang Chan

228 654 In 1952, the Thai government, at the suggestion of FAO, began to encourage tilapia culture. Fingerlings and some information on tilapia culture could be obtained from the Minburi district office, where a demonstration pond was maintained. Early in 1953, we learned from the records of the district officer that three persons in Bang Chan, two of them hamlet headmen, had obtained tilapia from this source. In 1953 the commune chief called a meeting in the village and explained the importance of tilapia raising. In May 1955 when Ralis conducted a survey in Bang Chan (Goldsen and Ralis, 1957), tilapia raising had been tried in nearly a third (31%) of the households, but was considered by 2/3 of the respondents to pay little.

The authors comment:

> From discussions with the people it appears that they are learning by trial and error to raise tilapia. Though fish culture is, for them, mainly a sideline activity, nevertheless, it requires the building of a special dam, care in preventing other fish from devouring young tilapia and maintaining the appropriate balance of fresh water in a given pool. The loss resulting from the fish dying or being eaten by others is relatively high. Although tilapia multiply [434] rapidly, the cash return is not as great as that realized from mushroom growing. The cycle of raising tilapia lasts about four months.

From the comments just quoted, tilapia culture appears to have been undertaken for the anticipated cash return. No [114] information was obtained by Ralis concerning the extent to which the villagers used tilapia to increase their supply of fish for home use. In the summer of 1957 members of the research group who visited Bang Chan found that no one was raising tilapia; they were neither a source of food nor of cash. Some indication was obtained that their flavor and texture were not agreeable. Clearly the attempt to introduce a rapidly growing but unfamiliar variety of fish failed in Bang Chan. *An understanding of the reasons for this failure* might help to prevent other costly failures in future.

Notes on Mushroom Culture in Bang Chan

177 244 Goldsen and Ralis (1957) commented as follows:

> Three years ago the commercial growing of mushrooms in Bang Chan was unknown. By 1955, the practice of growing mushrooms had reached into many homes (44 per

177
244 cent of the respondents report that they have engaged in this activity). Even if no mushrooms have ever been grown in a given household, it is still likely that the individuals in it are aware of the practice and have observed it closely through the mushroom growing activities of their friends, relatives, and neighbors (reported in 43 per cent of the households). Only a few households (13 per cent) report that they have never grown mushrooms or have never been exposed to it in this way.

243
244
234
177 At the height of the boom, the demand for rice straw swept many of the fields clean of the stubble usually left there after harvest, thereby decreasing food for the roaming buffalo and the small increment of nutrients usually plowed back into the soil.

The advantages of mushroom culture cited by Goldsen and Ralis (1957) were 1) the cash outlay required was small, 2) returns were realized quickly as the cycle was completed in two to three weeks, 3) little heavy work was required and 4) at the time when Ralis made the survey, a ready market was available. When, in 1957, the price dropped sharply, most of the growers gave up.

262
435
796
[431]
[792]
[875]

Food for Homage-to-the-Teacher Rite
Performed by a Buddhist Priest Who Was
a Traditional Practitioner

Item	Amount	Cost in Baht	Item	Amount	Cost in Baht
Cereals and Legume Seeds:			Fish and Meat (cont.):		
Rice noodles		10.	Dried fish	6	gift
Soybeans & fermented vegetables	25 kg.	12.	Roasted fish	3 kg.	gift
			Shrimp paste	2 kg.	18.
			Lobsters		15.
Mung beans	10 lit.	25.	Lobsters (for soup)		7.50
Cassava flour		2.25			
			Pig's skin (for soup)		10.
Sugar and dessert:			Beef[1]	15 kg.	150.
Palm sugar	1 pail	67.	Ingredients for Musselman curry[1]		27.
Cane sugar	14 kg.	85.			
(2)Kha-(5)nom (3)tuaj-(1)foo	500 cups	35.	Boiled chickens[2]	2	22.
			Pig's head[2]	4 heads	222.
Fish and Meat:			Pork[2]	4 kg.	40.
Fish ((1)plaa (2)myk) for soup		6.			
Silurus and serpenthead	60 kg.	gift			

262
435
796
[875]

Food for Homage-to-the-Teacher Rite (cont.)

Item	Amount	Cost in Baht
Fruit:		
Bananas ((3)kluaj (4)nam-(4)waa)	5 bun.	from father
Chico[2]		5.
Coconut	150	180.
Coconut (young, to make dessert)	30	30.
Job's tears	1 lit.	3.
Plums, yellow[2]		5.
Pomelos[2]		6.
Rose apples[2]		2.
Tamarind		7.50
Tomato sauce		8.
Young palm fruit[4]	7 bun.	3.
Vegetables (non leafy):		
Bamboo shoots, cooked	1 pail	28.
[272] Cucumber		--[3]
[273] Egg plants		--[3]
[276] Garlic	5 kg.	26.50
Gourd, white		1.
Onion, fragrant[5]		6.
Onion[5]	4 kg.	4.
Onion, welsh[5]		--[3]
Mushrooms		3.
Radish, white		--[3]
[354] **Vegetables (leafy green and yellow):**		
Cabbages		--[3]
Chinese kale		--[3]
Chili, green		7.50
Vegetables (leafy green & yellow) cont.:		
Lettuce		--[3]
Parsley		--[3]
Pumpkin	3 fruits	12.
Sweet basil leaves		1.
Sweet potatoes	6 kg.	6.
(3)Tang-(5)oo		--[3]
Seasonings etc.:		
Vinegar	1 bottle	1.
Fishsoy	1 jar	10.
(2)Ka-(1)chaaj	2½ kg.	12.50
Sodium glutamate		5.
Pepper		14.
Agar	400 gms.	36.
Miscellaneous:		
Cola beverage	72 bottles	72.
Liquor	16 bottles	80.[6]
Ice		30.
Cigarettes	2 pkgs.	--[6]
Tobacco	1 heap	--[6]
Betel pepper		9.
Fresh areca nut		10.
Dried areca nut		8.
Dried palm leaves	1 big bundle	2.
Firewood		50.
	Total	1577.75

[154]

---

1. *For Moslem guests.*
2. Food items placed on a tray and used in the ceremony proper.
3. Items so marked cost a total of 140 baht.
4. Not identified.
5. Several kinds of onions, both fresh and dried, are commonly used.
6. Prices not stated; estimate for liquor.

Table 16. Estimated Dietary Allowances for Residents of Bang Chan[1]

	Calories[2]	Protein[3]	Calcium	Iron	Vitamin A	Thiamine	Riboflavin	Niacin[4]	Ascorbic acid
		gm	gm	mg	I.U.	mg	mg	mg	mg
Adult man (52 Kg)									
Active	2500	60	0.5	8	2500	1.2	1.0	12	25
Adult woman (47.3 Kg)									
Active	1900	55	0.5	10	2500	1.0	1.0	10	25
Pregnant (latter half)	2300	80	0.8	18	4000	1.2	1.5	15	25
Lactating	2900	85	1.0	15	4000	1.5	2.0	15	30
Adolescents									
Boys 15-19 years	3000	80	1.0	12	4000	1.5	1.5	15	30
13-14 "	2500	70	1.0	12	3000	1.2	1.2	12	25
11-12 "	2000	60	0.75	10	2500	1.0	1.0	10	25
Girls 13-17 "	2500	70	1.0	12	3000	1.2	1.2	12	30
11-12 "	2200	65	0.75	10	2500	1.0	1.2	10	25
Children 9-10 "	1700	60	0.75	8	2500	0.7	1.0	7	25
7-8 "	1600	60	0.75	7	2500	0.6	1.0	6	20
5-6 "	1400	50	0.5	6	2000	0.6	1.0	6	20
3-4 "	1200	40	0.5	6	2000	0.5	1.0	5	18
1-2 "	900	35	0.5	5	1500	0.4	1.0	4	15
under 1 year	80/kg	3/kg	0.5						

1. This table was modified from Dietary Allowances Under Tropical Conditions (Nicholls, 1951, p. 315)

2. Adjustment of calories was made for adult man and adult woman, taking age, body size, climate and activity into account (Food and Nutrition Board, 1953. pp. 3-7 and FAO Committee on Calorie Requirements, 1950, p. 22; 400 calories extra were allowed for late (obvious) pregnancy and 1000 calories extra for lactation. Nicholl's estimates have been accepted for children and adolescents.

3. Protein allowances for sedentary man and woman were chosen for adults.

4. Allowance for niacin is 10 x thiamine allowance except that 15 mg rather than 12 mg was used for pregnancy.

Table 17. Estimated Dietary Allowances for Persons in Two Groups of Households, Participating in the Dietary Study, Bang Chan, 1953-54

	Group A										
Age Group[1]	Number	Average Age	Calories	Protein	Calcium	Iron	Vitamin A	B_1	Riboflavin	Niacin	Ascorbic Acid
				gm	gm	mg	I.U.	mg	mg	mg	mg
Men											
60+	1	63	2000	60	0.5	8	2500	1.0	1.0	10	25
50-59	2	51	4380	120	1.0	16	5000	2.2	2.0	22	50
40-49	1	41	2315	60	0.5	8	2500	1.2	1.0	12	25
30-39	2	35	4750	120	1.0	16	5000	2.4	2.0	24	50
25-29	-										
20-24	2	22	5070	120	1.0	16	5000	2.4	2.0	24	50
Women											
70+											
60-69	1	60	1570	55	0.5	10	2500	1.0	1.0	10	25
50-59	-										
40-49	2	46	3420	110	1.0	20	5000	2.0	2.0	20	50
30-39	1	34	1805	55	0.5	10	2500	1.0	1.0	10	25
	2[2]		5610	170	2.0	30	8000	3.0	4.0	30	60
20-29	1	20	1945	55	0.5	10	2500	1.0	1.0	10	25
Boys											
15-19	1	15	3000	80	1.0	12	4000	1.5	1.5	15	30
13-14	-										
11-12	2	11.5	4000	120	1.5	20	5000	2.0	2.0	20	50
Girls											
13-17	1	13	2500	70	1.0	12	3000	1.2	1.2	12	30
11-12	1	12	2200	65	0.75	10	2500	1.0	1.2	10	25
Children											
9-10	4	10	6800	240	3.0	32	10000	2.8	4.0	28	100
7-8	3	8	4800	180	2.25	21	7500	1.8	3.0	18	60
5-6	2	5.5	2800	100	1.0	12	4000	1.2	2.0	12	40
3-4	1	3	1200	40	0.5	6	2000	0.5	1.0	5	18
1-2	1	1	900	35	0.5	5	1500	0.4	1.0	4	15

Table 17. (continued)

Group A

Age Group[1]	Number	Average Age	Calories	Protein gm	Calcium gm	Iron mg	Vitamin A I.U.	B1 mg	Riboflavin mg	Niacin mg	Ascorbic Acid mg
Under 1 yr.	1[3]	3 mo.	720	27	0.5						
Total	32		61585	1882	20.5	274	80000	29.6	33.9	295	753
Round III[4]			61985	1907	20.8	282	81500	29.8	34.4	300	753
Round IV[4]			62585	1912	21.0	279	81500	30.1	34.9	300	758

---

1. Based on age at beginning of the study.
2. Two nursing women (no. 932 and 905), age 30-39.
3. One additional infant in group, during Round IV.
4. One 20-year old woman (no. 525) was obviously pregnant in Round III and nursing mother in Round IV of the dietary survey.

Group B

Men											
60+	1	64	2000	60	0.5	8	2500	1.0	1.0	10	25
50-59	1	53	2125	60	0.5	8	2500	1.1	1.0	11	25
40-49	3	46	6750	180	1.5	24	7500	3.3	3.0	33	75
30-39	1	39	2315	60	0.5	8	2500	1.2	1.0	12	25
25-29	1	25	2500	60	0.5	8	2500	1.2	1.0	12	25
20-24	3	21	7650	180	1.5	24	7500	3.6	3.0	36	75
Women											
70+	2	80+	2760	110	1.0	20	5000	2.0	2.0	20	50
60-69	-										
50-59	1	59	1570	55	0.5	10	2500	1.0	1.0	10	25
40-49	1	46	1710	55	0.5	10	2500	1.0	1.0	10	25
30-39	2	36	3610	110	1.0	20	5000	2.0	2.0	20	50
	1[2]		2805	85	1.0	15	4000	1.5	2.0	15	30
20-29	1	22	1930	55	0.5	10	2500	1.0	1.0	10	25

Table 17. (continued)

Age Group[1]	Number	Average Age	Calories	Protein	Calcium	Iron	Vitamin A	B_1	Riboflavin	Niacin	Ascorbic Acid
	Group B										
				gm	gm	mg	I.U.	mg	mg	mg	mg
Boys											
15-19	2	15	6000	160	2.0	24	8000	3.0	3.0	30	60
13-14	2	13	5000	140	2.0	24	6000	2.4	2.4	24	60
11-12	1	12	2000	60	0.75	10	2500	1.0	1.0	10	25
Girls											
13-17	2	15.5	5000	140	2.0	24	6000	2.4	2.4	24	60
11-12	-										
Children											
9-10	3	10	5100	180	2.25	24	7500	2.1	3.0	21	75
7-8	3	8	4800	180	2.25	21	7500	1.8	3.0	18	60
5-6	2	6	2800	100	1.0	12	4000	1.2	2.0	12	40
3-4	2	4	2400	80	1.0	12	4000	1.0	2.0	10	36
1-2	1	2	900	35	0.5	5	1500	0.4	1.0	4	15
Under 1 yr.	1[3]	3 mo.	240	5	0.5						
Total	37		71965[2]	2154	23.75	321	93500	35.2	38.8	352	876
Round III[4]			72365	2179	24.05	329	95000	35.4	39.3	357	376
Round IV[4]			72965	2184	24.25	326	95000	35.7	39.8	377	881

---

1. Based on age at beginning of the study.
2. One nursing woman (no. 752), age 30-39.
3. One additional infant in group, during Round IV.
4. One 38-year old woman in Group B (no. 732) was obviously pregnant in Round III and was a nursing mother in Round IV of the dietary survey.

Table 18. Average per Capita Dietary Allowances for Persons in Two Groups of Households Participating in the Dietary Study, by Round and for the Year, Bang Chan, 1953-54

	Calories[1]	Protein	Calcium	Iron	Vitamin A	Thiamine	Riboflavin	Niacin	Ascorbic Acid
		gm	gm	mg	I.U.	mg	mg	mg	mg
Group A									
Round I	1925	58.8	0.64	8.6	2500	0.93	1.06	9.2	24
Round II	1925	58.8	0.64	8.6	2500	0.93	1.06	9.2	24
Round III[2]	1937	59.6	0.65	8.8	2544	0.93	1.08	9.3	24
Round IV[2]	1956	59.7	0.66	8.7	2544	0.94	1.09	9.3	24
Average per capita	1936	59.2	0.65	8.7	2522	0.93	1.07	9.3	24
Group B									
Round I	1945	58.2	0.64	8.7	2527	0.95	1.05	9.5	24
Round II	1945	58.2	0.64	8.7	2527	0.95	1.05	9.5	24
Round III[2]	1956	58.9	0.65	8.9	2568	0.96	1.06	9.6	24
Round IV[2]	1972	59.0	0.66	8.8	2568	0.96	1.08	9.6	24
Average per capita	1955	58.6	0.65	8.8	2548	0.96	1.06	9.6	24

[1] Adults were considered to be "active." The estimates therefore represent values intermediate between those appropriate for heavy farm work, during planting and harvesting, and the relative inactivity of the intervening periods.

[2] One 24-year old woman in Group A and one 38-year old woman in Group B were obviously pregnant in Round III, and they were both nursing mothers in Round IV of the dietary studies. Young infants were not counted separately in Round IV, as they were receiving mothers milk only.

APP3NDIX C

Guides Prepared for the Observer Who Carried Out the Dietary Study

114
125
124

Preliminary Visit to Participating Households

Households selected for dietary study are to be visited in advance, acquainted with the procedure which we wish to follow, and asked for their cooperation.

The following points should be emphasized:

1) Meals should be prepared as usual both in amount and kind. Workers wish to know how much food and what kind, the family eats.

2) Each item of food which enters into the meal preparation will be weighed before cooking.

3) Each prepared food (as cooked rice, fried fish, curry, etc.) will be weighed when the preparation is finished.

4) Amounts of prepared food given to priests, fed to animals or left over, must be weighed, so that the amount of food actually eaten by the family can be calculated.

5) As often as possible survey members would like to be present during the meal, but will not accept food from the household.

6) Each member of the family will be asked to report to the survey worker what is eaten between meals. If the snack is eaten at home, it should be brought to the survey worker first, to be weighed. If the snack is eaten away from home, individuals are asked to tell the survey worker as clearly as possible what was eaten, and how much.

Preliminary information to be obtained at this interview:

1) Usual number of meals taken by the family at this season.

2) Usual time of meals.

3) Time when food preparation is started in the morning, and when evening meal is over.

The family should be told that the survey workers will come sometime during the next two weeks. They should not be told which day, as that might lead them to make some changes in their usual diets, either consciously or unconsciously.

114 The schedule of visits should be such that each day of
124 the Buddhist "week" will be appropriately represented, i.e.
125 the day before the holy day, the Buddhist holy day, and the 5 or 6 days which follow. Days of special festivals should not be included in the dietary survey, although the investigators should attend many of these, and record observations on the foods served.

Dietary Survey Proper: General Procedures, with Alternative Suggestions

Twenty-four hour period. - Each visit should cover a 24-hour period. After preliminary experience, a good plan seems to be to go in the early afternoon, in time to see the preparation for the evening meal, and to return early the next day, remaining until the 24-hour period is up. This plan has several advantages over making one's first appearance before breakfast:

1) The homemaker may be introduced to the procedure at a time when she is less hurried than she is apt to be in the morning, when she must have food ready for the priests at a fairly definite time.

2) Scales and other equipment may be left overnight, so that these need not be carried before dawn, along with food and water for the survey worker.

3) The risk that food preparation will be started before the worker comes is less if the homemaker expects the survey worker before breakfast.

4) If the worker's visit is anticipated, someone at the house will restrain the dog if necessary.

5) For the more remote households, arrangements can probably be made to stay overnight at the home, or nearby, without previous notification as to the exact date of one's visit.

Because the observer may leave in the afternoon before children return from school, she should ask about snacks eaten away from home on the first afternoon, so that record will be obtained of such snacks eaten on one day, though not necessarily during the same 24-hour period as the other meals recorded.

Number of Visits. - Aim to visit each of the 11 families once each 3 months, i.e. 4 times in the year. This means once during the cool season, once during the dry season, and twice during the rainy season, i.e. early and late. From May 25, 1953 to the end of April 1954 there are 49 weeks. In a schedule calling for one survey day each week, this would allow 5 weeks for unforeseen circumstances which might interfere,

114 or for planning time off because of holidays, celebrations,
124 etc.

125 Scheduling of Visits. - Plan to see the families in rotation, going to those in groups A and B on alternate weeks, so that seasonal variation in food supply will not be a major difference between the two groups. The survey worker must have in mind another nearby home, however, which might be visited if the original plan cannot be carried out on a given day.

The survey worker should not give advance notice of the exact day when she plans to come, unless the householder has specifically requested this. Even when notice is requested, it need not be long in advance, i.e. one could stop by in the morning and ask if it would be all right to come back in the afternoon to watch supper preparation.

Directions for Use of Schedule 8 on Which Data Obtained During the Dietary Survey are to be Recorded.

Most of the items in this schedule may be filled in from census information or by direct observation by the survey worker. The worker will need to enquire re item E. the makeup of the food consumption unit, and J 4, the cost of raw foods purchased. The survey worker should try to observe other items during the day, and fill in by inquiry, if necessary, at the end of the day. Note whether information was obtained by observation (ob) or inquiry (q).

A. Hamlet and house number should be written in from the census information, and should correspond to that on schedule 3 for the same household.

B. Each Household to be visited for dietary survey will be given a key number in advance. This number should be inserted here.

C. Head of household (from census information).

D. Religion. - Some dietary practices are associated with religion, therefore indicate whether the household is Buddhist or Islam by checking the appropriate space.

E. Composition of food consumption unit: List here all persons whose food is prepared in the kitchen which the observer is visiting. Note that all persons living in one household (i.e. at the same house number) may not belong to one food consumption unit.

F. Source and treatment of water. - Find out, by observation if possible, from what source or sources water is obtained for drinking and food preparation, at this season. Note

114 whether or not water is boiled or treated otherwise before
124 use.
125

G. Garbage disposal. - While making the dietary survey, the observer should note what is done with garbage. Is edible waste given animals? Is garbage disposal carried out in such a way that it will not attract flies, etc.?

H. Protection of food against contamination. - The observer should note what means are used by the householder to protect both staple and perishable foods from contamination by insects and animals. If the householder's practices are not consistent, the observer should note this, either on the schedule, or in her note book. In the latter case, the schedule should be plainly marked "see notes."

I. Family member observed at meal time. - We have been unable to think of any plan for weighing foods consumed by individual members of the family without disturbing the customary eating procedures. The observer may be able, however, to get some idea as to how food is distributed in the family, by observing one person at a time, and recording her estimate of the individual food intake.

The person chosen for observation should be one of the family members who would be most vulnerable to an inadequate food supply, for example a pregnant or lactating woman, a young baby, a growing child or an old person. The observer should fix her attention on the person to be observed, throughout the meal, and should record as well as possible the amounts eaten of each type of food. Record amounts taken onto the plate, amounts left on the plate at the end of the meal, number of bites or spoonfuls of each item eaten a) directly from the serving dishes and b) after the food is put on the plate. Check your estimates of amount eaten by the person observed with reference to the total prepared for and consumed by the family.

From observations of this sort we hope to get information on questions such as the following:

1. When a child is said to eat all adult food, does this mean that the kinds of "with-rice" and the proportions of rice to "with-rice" are the same for him as for adults?

2. If a pregnant or lactating woman says she eats as usual except for the hot tastes, does this mean a) that she omits or decreases intake of peppery foods and eats no more than usual of other foods or b) that she omits or decreases intake of peppery foods and eats more rice and/or less highly seasoned "with-rice" items? In the case of a child, note carefully any remarks made by adults urging him to eat more of, or suggesting that he eat less of a given item.

114
125

J. Food preparation and consumption

In the schedule, each column has a descriptive heading and a number. On the sheet used for calculating "adjusted consumption," the numbers alone are used.

1. Menu. Record title of meal as "breakfast" or "dinner" and time served. List all foods served at each meal, including leftover foods from the previous day. If foods left over from an earlier meal on the same day were used, note this fact, since weight of raw food, noted when the food was prepared can be used in calculation.

Raw ingredients

2. Kind. Note here the name of each ingredient, and any description needed, i.e. fat or lean pork, hen or duck egg, etc. Since rice is served at each meal the terms "home milled" and polished are listed here. Cross out the inappropriate one.

3. A.P. (as purchased) weight. Record here the weight of the food as it is purchased, or as it comes from the storehouse, garden or canal. If several food items are used in preparation of one dish, bracket these together.

4. Cost. For foods which have been purchased, record cost of the amount used. For example, if 3 fish were purchased for 1 baht, but one only was prepared at this time, record 33 stg. as the cost. If the food was produced at home, grew wild, or was received as a gift, note this.

5. Inedible refuse. Note weight of inedible refuse which is discarded during preparation. If the inedible portion is included in the cooked dish, weigh it later and record the weight in this column.

6. E. P. (edible portion). Add together all weights of inedible refuse for a given item to get the total for item 5. Subtract 5 from 3 to get this figure.

Note on weighing raw food: So far as possible, weigh raw food and inedible refuse on waxed paper (weight negligible) or in standard utensils (enamel plate, plastic bowl, etc.) the weights of which are known. Record: weight of A.P. food on utensil minus weight of utensil equals weight of food. For example, if rice is weighed in a plastic bowl weighing 90 g., and the total weight is 870 g., 870-90 = 780 (g. rice). The observer is less apt to make mistakes if she uses the same containers repeatedly, than if containers used are provided by the household, and vary widely in weight. The balances provided for weighing food are 3 kg./10 g. and 1 kg./4 g. Small amounts of food should always be weighed on the 1 kg. scale, since it is more sensitive than

114 the 3 kg. scale. If a number of items are used in small
125 amounts, weights may be approximated more closely if the items are placed one after another, on a piece of waxed paper, noting each time the added weight causes the indicator to move. Thus the red or green pepper alone might not weigh enough to affect the indicator, but these together with other green or leafy materials used (as lemon grass, coriander leaves and sweet basil) might weigh 8 grams. In a marginal diet, the contributions of such items to the nutritive value of the diet should not be overlooked.

Cooked foods. - For cooked foods, which must often be weighed in a container provided by the family, columns are provided for weight of dish (7), of dish plus food (8) and of food (9). For example, if rice is to be cooked in an aluminum kettle, weigh the empty kettle and record this weight in column 7. When the rice is done, and ready to serve, weigh kettle plus cooked rice, and record this in column 8. Subtract 7 from 8 and get the weight of food, to be recorded in column 9.

Use of cooked food

10. If food is given away, weigh dish and food before and after the food is offered, to get weight of food given away. Record the weights before and after and the difference, in column 10. Specify whether the recipient is priest, neighbor, relative etc. If inedible portion is included, note this and weigh it if possible.

11. Fed to stock. If inedible portion is given, note this and weigh it if possible. Specify if fluid only is given, or if part of the complete dish.

12. Edible waste. Specify if this is fluid only or a representative part of the complete dish.

13. Left over. Specify if this is fluid only or a representative part of the complete dish. Note if inedible portion is included and weigh it if possible. If you must leave in the evening before all family members have eaten, explain that you wish to weigh all left over food, and arrange to have it kept in separate dishes so that you can weigh it in the morning.

14. Food eaten. Weigh the pot or serving dish before and after the meal. At the end of the meal, weigh inedible portions left on plates or in the pot, and correct for those to get the weight of cooked food actually eaten.

15. Persons eating. Record here the number of persons in the consumption unit (item E) minus the number absent from this meal (x), plus the number of guests (y). Thus if there are 6 members of the family, one of whom is away, write 6 - 1 x = 5. Similarly if there are 6 members of the family,

114plus a guest, write 6 + 1 y = 7. If one member of this family
125is away but a guest is present, write 6 - 1 x + 1 y = 6. In calculating, if the number of persons eating a given meal differs from the usual number in the household, the amount of a given food eaten is multiplied by a factor representing the number of persons in the household/number of persons present. Thus if a guest shares the meal in a household consisting of 6 persons, all of whom are present, the weight of each food eaten should be multiplied by 6/7 to get the "adjusted consumption," for which nutritive value is to be calculated. Similarly, if 5 only of the 6 members of the household eat a given meal at home, the weight of each food eaten should be multiplied by 6/5 to get the "adjusted consumption."

16. Methods of preparation. Describe the method of preparation clearly enough so that one who was not present could visualize it. Specify if soaking or cooking water is discarded. Note cooking time and appearance of cooked product when these give a clue as to probable nutritive value. Thus greens which are added at the last, cooked only a short time so that they retain their color, may be expected to retain a maximum amount of their vitamin C. Note type of equipment used.

K. Snacks. Record snacks eaten between meals on the separate sheet provided. Ask persons who eat snacks at home to bring them to you first, to be weighed. Question each member of the family about foods eaten away from home during the day, and record the kind of snack, description, and weight. (Estimated weights should be put in parenthesis, to distinguish them from observed weights.) If the snack was purchased, record the cost. Under "person eating" note the name of the family member who ate each snack.

From these data we hope to get an idea as to the nature and probable nutritive value of snacks, and whether these are eaten by all or most members of the family, or by certain ones only, as by the school children at recess.

SCHEDULE FOR DIETARY STUDIES

125 Cornell University Thailand Project 1952-53 Schedule 8
Date..............

A. Hamlet........ House No.......... B. Household No.........

C. Head of Household a)............ b)............ D. Buddhist.......
Islam...........

E. Food consumption unit. List here the names of persons who usually eat food prepared in the kitchen where observations are being made:

1)............... 5)................. 9)...................
2)............... 6)................10)...................
3)............... 7)................11)...................
4)............... 8)................12)...................

F. At this season what kind of water is used for each of the following purposes, and what treatment, if any, is given to it?*

USE	SOURCE			TREATMENT			
	Rain	Canal	Fish-pond	None	Alum	Boiling	Other (what)
1. Drinking, adults							
2. Drinking, children							
3. Washing vegetables							
4. Cooking							
5. Washing dishes							

G. How is garbage disposed of? (check)
1. Buried.................
2. Burned.................
3. Thrown into canal......
4. Thrown elsewhere.........
5. Fed to animals...........
6. Other....................

---

* Indicate whether answer is obtained by query (q) or observation (obs.)

125 H. Does the householder attempt to protect food against contamination by insects, animals etc? Note moans used.

	Type of food	
Means used	1) Dry rice and other nonperishable foods	2) Perishable foods & left-over cooked foods
1. Container covered:		
a) Solid cover		
b) Fiber cover		
2. Food safe:		
a) Screened		
b) Ant-proof legs		
3. Other		
4. [✓ None]		

I. Family member observed at meal-time . . . .
Notes re kind and amount of food eaten by this person:

Food Preparation and Consumption   Sept. 25, 1953   Household No. 21

	Raw Ingredients						Cooked Foods		
Menu 1	Kind 2	Wt. A.P. 3	Cost 4		Ined. Ref. 5	E.P. 6	Dish 7	Dish + Food 8	Food 9
			Bt.	Stg.					
Meal Time							800	2990	2190
4:30 a.m.		2180-800					120	1280	1160
Cooked rice	Polished	= 1380					190	850	660
									4010T[1]
(1) Bauaun stew	(leftover)						450	915	465
(2) Sa-(5)noo stew	Coconut meat (to make milk)	700-180 = 520		50		520)			
	Dried chilies	24		15		24)			
	Onion	8		4		8)			
	Galangal (HG)[2]	8				8)			
	Garlic	4		2		4)			
	Lemongrass (HG)	12				12)			
	Bergamot rind (G)[2]	4				4)	450	1390	940
	Salt	30				30)	130	312	182
	Serpenthead (C)[2]	320-120=200				200)	130	300	170
	Shrimp paste	6		3		6)	130	260	130
	(2)Sa-(5)noo flowers (G)	550			580-520 = 60	640-150 = 490)			1422T
	Coconut milk					1220-450 = 770)			
	Palm sugar	240-200= 40		24		40)			
Cooked rice	(leftover)						520	800	280
Fried duck egg	1 Duck egg	76			21	240-185 = 55			
	Coconut oil	16		8		16			
	Onion	4		2		4			
	Fishsoy	10		5		10	180	260	80

1. T equals total weight.
2. HG, G and C stand for home grown, gathered and caught, respectively.

Food Preparation and Consumption (continued)   Sept. 25, 1953   Household No. 21

825
352
372
492

Use of Cooked Foods						
Given away 10	Fed to Stock 11	Ed. Waste 12	Left Over 13	Eaten 14	Persons Eating 15	Method of Preparation
Cooked rice 850-190= 660 (to 3 priests)			0	3350	4	Rice, 4:30 a.m. She washes rice two times and lights the fire. Then she puts rice pot on fire at 4:35. Rice water is drained off at 5:00. Rice pot is put on fire again from 5:15 to 5:25.
			(1)Beuaun stew (leftover) 0	465		(1)Beuaun stew is reheated from 5:00 to 5:15 a.m.
(2)Sa-(5)noo stew 312-130=182 300-130=170 260-130=130 482 (to 3 priests)			0	940		(2)Sa-(5)noo stew, 5:20 a.m. Dried chillies (after soaking in water for a while), onion, garlic, galangal, lemongrass, bergamot rind, and salt all pounded together. 5:25 She crushes coconut meat with water five times over colander. Shrimp paste is mixed with (4)nam (4)phrig at 5:40. The pot of coconut milk is put on fire at 5:42. (4)Nam (4)phrig is mixed with boiled coconut milk at 5:55. Fish is put into the pot and water from crushed tamarind at 6:00, (2)sa-(5)noo flowers at 6:05. The pot is put down at 6:12 a.m.
			Cooked rice (leftover) 0	280		
			Fried duck egg 0	80		Fried duck egg. The pan is put on fire at 6:15 a.m. Duck egg is mixed with pieces of onion and fishsoy. Coconut oil is put into the pan at 6:20. Stirred egg is fried from 6:20 to 6:25.

E. Snacks

Person eating 1	Time 2	Kind and description 3	Weight (or approx. wt.)			Cost 7	
			A.P. 4	Ined. ref. 5	E.P. 6	Bt.	Stg.
			g.	g.	g.		
June 4/53							
Girl, 8 yrs.	12:00m	She ate a half fruit of pineapple at home. It was bought from the selling boat.	(375)	(195)	(180)		20
June 5/53							
Girl, 8 yrs. Boy, 10 yrs. Girl, 13 yrs.	All day	7:40 - The pot of truffles (gathered from the fields) is put on fire. It is boiled with water and salt. Truffles: 525-72 = 453 gm. Salt: 35 gm. It is finished at 8:28.	453				
Boy, 10 yrs.	8:46	He eats boiled banana (HO)	48				
Girl, 13 yrs.	Early a.m.	She drinks coffee which is bought from the store near the Wat.					40
Father	10:13	He drinks one glass of milk which is bought from the store near Wat.					50

Form for Calculating Raw Weights of Foods Eaten

Dietary Survey, Bang Chan — Household No. 12 — Date Jan. 14, 1954

Amounts of foods prepared and eaten — No. persons in household 3

Meal - menu	Raw ingredients				Cooked food	Use of cooked foods					Adjustments-raw wt.		
1	2[1]	3	5	6	9	10	11	12	13	14	For amt. eaten	15	For No. people
4:00 p.m.													
Cooked rice	Polished	610			1640				500	1140		3	
Baked egg plants	3 egg plants	370		370	240				0	240			
Fish "salad"	Lemongrass (HG)[2]	36		36)									
	Holy basil (HG)	44	20	24)	115				0	115			
	1 fish (cooked)	52	12	40)									
	Lime (1/2 fruit)	30	12	18)									
Cooked rice	(Leftover)				250				0	250			
6:55 a.m.													
Cooked rice	Polished	950			2390				800	1590		3	
Roasted fish	2 fish	112			96				0	96			
Cooked rice	(Leftover)				500				0	500			
Chili sauce	Bird pepper (HG)	12		12)									
	Shrimp paste	10		10)									
	Garlic	8		8)	45				20	25			
	Palm sugar	10		10)									
	Lime	12	4	8)									

---

1. For identification of column numbers, see the original schedule, pp. 118-119 and pp. 113-114
2. HG stands for home grown.

Dietary Study, Bang Chan - Nutritive Value
of Total Foods Eaten in 24 Hours

Household No. 16

Date: July 23, 1953
Persons Eating: 8

Raw Ingredient	Adj. cons.	Calories	Protein gm.	Fat gm.	Carb. gm.	Ca mg.	P mg.	Fe mg.	Vit. A I.U.	B_1 mg.	Ribo. mg.	Niacin mg.	Vit. C mg.
Rice, home milled	3877	14074	295	43	3036	426	8568	46.5	(0)[1]	7.37	1.94	120.2	0[1]
Dried fish	450	864	189	7	0	293		11.3	0	0.27	1.40	20.7	0
Bottle gourd	1535	261	9	3	58	164	276	9.2	1075	0.61	0.77	15.4	154
Swamp cabbage	480	139	14	1	26	350	245	12.0	30240	0.34	0.58	3.4	154
(2)Phag (2)ka-(2)cheed	40	11	1	0	2	66		1.2	2400	0.04	0.08	0.3	28
Coconut milk[2]	1010	735	8	99	42								
Pork fat	36	325	0	36	0	0	0	0	0	0	0	0	0
Fishsoy	48	23	2	2					0	0.01	0.04	1.1	
Shrimp paste	16	19	4	0					0	0	0.02	1.0	-
Chilies, dried	20	49	3	1	6	32	74	0.5	115	0	0	0	10
Garlic	16	15	1	0	4	7	21	0.2	0	0.04	0.01	0.1	2
Bird pepper	10	3	0	0	1	2	-	0.1	600	0.01	0	0	20
Onion	4	1	0	0	0	1	2	0	2	0	0	0	1
Lime	4	2	0	0	1	(2)	(1)	(0)	0	(0)	(0)	(0)	1
Palm sugar	25	96	0	0	24	20	10	2.9	0	0	0	0.3	0
Salt	20	0	0	0	0	46	0	0.1	0	0	0	0	0
Total		16617	526	152	3200	1429	9197	84.0	34432	8.69	4.84	162.5	370
Average/cap.		2077	66	19	400	179	1150	10.5	4304	1.09	0.60	20.3	46

1. ( ) means imputed value; 0 means none or insignificant amount; - means no values available, but probably contains measurable amount; blank space means no information found.
2. See Appendix C, pp. 128-129.

105
146
262

Dietary Study, Bang Chan - Nutritive Value[1]
of Total Foods Eaten in 24 Hours

Household No. 12

Date: Jan. 14, 195
Persons Eating:

Raw Ingredient	Adj. cons.	Cal-ories	Pro-tein gm.	Fat gm.	Carb. gm.	Ca mg.	P mg.	Fe mg.	Vit. A I.U.	B_1 mg.	Ribo. mg.	Nia-cin mg.	Vit. C mg.
Rice, polished	1335	4806	91	9	1053	80	1869	10.7	(0)	1.60	0.40	20.0	(0)
Egg plant	370	89	4	1	20	56	137	1.5	111	0.15	0.19	2.2	19
Fat fish	152	275	28	18	0	56	321	1.5	0	0.09	0.06	6.1	0
Lemongrass	36												
Holy basil	24	23	2	0	4	15	2	0.7	3024	-	0.55	-	1
Lime	22	8	0	0	3	9	5	0.1	0	(0.01)	0	0	6
Bird pepper	7	2	0	0	0	1	-	0.1	402	0	0	0	13
Shrimp paste	6	6	1	0	0				0	0	0.01	0.3	
Palm sugar	6	21	0	0	5	4	2	0.6	0			0.1	
Garlic	4	4	0	0	1	2	6	0	0	0.01	0	0	1
Total		5234	126	28	1086	227	2342	15.2	3537	1.86	1.21	28.7	40
Average/cap.		1745	42	9	362	76	781	5.1	1179	0.62	0.40	9.6	13

1. ( ) means imputed value; 0 means none or insignificant amount; - means no values available, but probably contains measurable amount; blank space means no information found.

127
146
262

Foods for Which Values Were Obtained from Miscellaneous Sources, or Imputed by the Authors

Name of Food	Source or Basis for Imputed Values
Cereals	
Rice, glutinous, black	Values for glutinous rice
Animal Foods	
Fermented fish	Values from Thai table; vitamin analysis for FAO by Hoffman-La Roche, Ca value from Knudson (1955).
Shrimp paste	Values from Thai table; vitamin analysis for FAO by Hoffman-La Roche.
Fishsoy	Values from Thai table; vitamin analysis for FAO by Hoffman-La Roche.
Field rats	Values from Chatfield et al. for mammals, dressed.
Fruits	
(2)Ma-(1)dan, fruit	Leung et al. Unspecified fruits, tropical areas.
Manila tamarind	Leung et al. Unspecified fruits, tropical areas.
Rambai	Willimott
Thai nutmeg	Values for persimmon
Vegetables	
(1) Bauaun	Values for eggplant
Bergamot rind	Aykroyd et al., values for lime peel.
Celery leaves, Chinese	Values for celery leaves and stalks, Chinese.
Coral	Leung et al., values for dark green leaves
Cucumber	Watt et al., for figures for Fe and Vitamin A in cucumber with skin.

127
146
202

Galangal	Leung et al., values for ginger root.
(1)Jeuan	Leung et al., values for dark green leaves.
(3)Khii-(2)leg	Leung et al., values for dark green leaves.
(4)Khlyb	Leung et al., values for dark green leaves.
Lotus stalk	Leung et al., values for lotus root.
(2)Ma-(1)dan leaves	Leung et al., values for dark green leaves.
(4)Ma-(5)khya (2)khaj (2)taw	Values for eggplant.
Morinda	Leung et al., values for dark green leaves.
(2)Phag (2)ka-(2)cheed	Leung et al., values for dark green leaves.
Sweet potato	Chatfield, values for vitamin A in pale variety.

Foods for Which Nutritive Values Were Not Calculated and the Total Amounts Eaten by Two Groups of Households Throughout the Survey

Name of food	Amounts Eaten Group A	Group B
	g	g
Bergamot leaves	5	15
(2)Fa-(1)chaaj	15	71
(2)Kha-(1)cpuaum flowers	25	0
Lemongrass	135	154
(2)Sa-(5)noo flowers	216	1078

262 List of Foods[1] Included in Each Food Group

I. Rice and other cereals

Popcorn
Rice flour
Rice, glutinous
Rice, glutinous, black
Rice, home-milled
Rice, noodles
Rice, polished
Wheat bread

II. Fish and other animal foods

Beef
Chicken
Crab, salted field
Eel
Eggs, duck
Eggs, hen
Fish, canned
Fish, dried s[illegible]ed
Fish, ferment[illegible]
Fish, fresh
Fishsoy
Frogs
Milk
Oysters, dried
Pork
Rats, field
Shrimp paste
Water buffalo

III. Green and leafy vegetables

Beans, string
"Bergamot" leaves (Citrus hystrix)[2]
Chilies, fresh, green and red (Capsicum annuum)
Chilies, small, or bird-pepper (Capsicum frutescen[illegible]
Chinese cel[illegible]) (Brassica pekinensis)
Coral (Erythrina fusca)
(2)Kha-(1)causun leaves (Telosma cordata)
(3)Khii-(2)leg (Cassia siamea)
(4)Khlyb (see footnote p. 30.)
Leeks
Lemongrass (Cymbopogon citratus)[2]
Lettuce, head
(4)Ma-(1)dan leaves (Garcinia schomburgkiana)
Morinda, (1)jaunu (Morinda citrifolia)
Onion leaves
(2)Phag (2)ka-(2)cheed (Neptunia prostrata)
(2)Sa-(1)daw (Melia indica)
(2)Sa-(5)noo, leaves and flowers (Sesbania roxburghii)[2]
Swamp cabbage, (2)phag (3)bung
Sweet basil (Ocimum basilicum)

IV. Other vegetables

(1)Bauaun - (a member of the Araceae (arum family) perhaps a species of Alocasia)
Bamboo shoots
Bean, mung
Bean, sprouts
Calabash
Cassava
Chili, dried
Cucumber
Egg plants
Garlic
Gourd, bitter (Momordica charantia)
Gourd, bottle (Lagenaria leucantha)
(2)Kha-(1)causun flowers (Telosma cordata)[2]
Leeks, flowers
Lotus stems (Nelumbo nucifera)
Mushrooms, straw
Onion, mature or bulbs
(2)Phag (2)tob (Eichhornia crassipes)
Peanuts
Radish, white
Radish, salted
Sweet potato (pale yellow)

262 Other vegetables (continued)

Taro
Turmeric, white
Water chestnut, Chinese or
black truffle
(Eleocharis dulcis)
West Indian pea tree,
(1)Khaeae flowers,
(Sesbania grandiflora)

V. Fruits

Coconut and its products

Coconut meat
Coconut sport
Coconut milk
Coconut cream

Fruits other than coconut

Banana, (3)kluaj (4)nam-(4)waa
Guava (Psidium guajava)
Hog plum (a species of spondias)
Jack fruit (Artocarpus heterophyllus)
Jujube (Zizyphus jujuba)
(2)Ka-(4)tauaun (Sandoricum indicum)
Limes
Lotus seeds (Nelumbo nucifera)
(4)Ma-(1)dan fruit (Garcinia schomburgkiana)
Mango
Manila tamarind (Pithecellobium dulce)
Muskmelon
Olive
Orange, sour
Orange, sweet
Papaya
Pineapple
Rambai, (4)ma-(1)faj (Baccaurea sapida)
Rambutan (Nephelium lappaceum)
Star gooseberry (Cicca acida)
(2)Ta-(1)koo (a species of Diospyros)
Tamarind (Tamarindus indicus)
Thai nutmeg (a species of Diospyros)
Watermelon

VI. Fats and oils

Coconut oil
Pig's skin
Pork fat

VII. Sugar

Palm sugar
Sugarcane

VIII. Miscellaneous and spices

Agar
Bergamot, rind
Cardamom
Cinnamon
Coriander seeds
Fennel
Galangal (Alpinia officinarum)
Ginger (Zingiber officinale)
Holy basil (Ocimum sanctum)
(2)Ka-(1)chaaj (Boesenbergia pandurata)[2]
Nutmeg
Pepper, black
Salt
Vinegar

---

[104] 1. English names, where known, are given first. Thai terms are given where no common English name was known. Both Thai terms and scientific names are given for plants which may be unfamiliar to many Western readers.

2. Foods for which no nutritive values were found nor imputed.

NOTES ON THE PREPARATION AND NUTRITIVE VALUE OF COCONUT MILK AND COCONUT CREAM

252 262 [014] [171] The term coconut cream ((5)hua (2)ka-(4)thi), as it was used in Thailand, referred to the product which was made by squeezing grated coconut with little or no addition of water. Coconut milk ((4)naam (2)ka-(4)thi) was made by squeezing grated coconut repeatedly with water. Coconut cream might be made first, and the residue extracted one or more additional times to obtain coconut milk. The terms coconut milk and coconut cream apparently are not used consistently. Losee (1952) commented on this when he described the preparation of coconut cream in Samoa, and said that it was sometimes called coconut milk. Miller et al. (1936), in describing the preparation of coconut milk said "If a thick coconut milk to serve over puddings, taro leaves, etc. is desired, 1/2 to 3/4 cup of coconut water or boiling water should be poured over 3 cups of grated coconut. . . . If the milk is to be used in curry sauce for chicken, eggs, shrimps, or in cornstarch pudding, a larger quantity of water (1 to 2 cups of water to 3 cups of grated coconut) may be used."

126 In carrying out the dietary study, the observer weighed the grated coconut meat, the residue and the final products, coconut milk or cream, or both. She did not weigh the water as it was added in successive portions, but the amount of added water could be calculated.

194 262 146 171 262 The ratio of coconut milk to meat varied considerably, but on the average, households in Group A obtained coconut milk which weighed more than eight times as much as the coconut meat from which it was made. Households in Group B obtained less than 2½ times as much milk by weight as coconut meat. The number of extractions made varied from 2 to 6, with a mode of 3. Obviously, the products made by Groups A and B, although both called coconut milk, had markably different percentage composition, and neither was similar to "coconut milk" for which values could be found. These values were as follows:

		Coconut milk		
		grams per 100 gm. E. P.		
Authors	Location	Pro.	Fat	Carbo.
Bocobo et al.	Philippine Islands	3.6	33.2	38.4
Food and Drug Division	Thailand	3.52	34.75	1.52
Miller et al.	Hawaii	4.0	27.0	18.9[1]

---

[1] Personal communication

128 146 242 In calculating values to be used in our estimates of nutrient content of diets in Bang Chan, we made two assumptions: 1) that the "expressed coconut milk" described by Miller et al. was similar to coconut cream as made in Bang Chan, and 2) that coconut milk as made in Bang Chan differed from coconut cream primarily by dilution. When coconut milk was made by successive extractions after coconut cream had been prepared, the combined weights of cream and milk were taken to represent the yield of coconut milk from the weight of meat used.

The ratio of coconut cream to coconut meat was approximately the same, 0.30 for households in Group A and 0.33 for those in Group B, but Group A used more water in making coconut milk than Group B. By calculation, we obtained the following figures for the percentage of protein, fat and carbohydrate in coconut milk as made in the two groups of households.

Estimated Composition of Coconut Milk as
Made in Two Groups of Households, Bang Chan

	Grams per 100 gm. E. P.		
	Protein	Fat	Carbo.
Group A	0.15	1.0	0.7
Group B	0.5	3.6	2.4

The need for a guide for calculating composition of various coconut milks, based on actual analysis of the products as made at home is apparent. Since coconut milk was used almost daily in Bang Chan, use of the figures which we found in the literature would have introduced a major error into our calculations. Using figures from the table designed for use in Thailand (Food and Drug Division, Bangkok, 1953), the average per capita caloric intake per day, from this source for the families studied would have been over 300 calories, as compared to about 45 calories, using the figures calculated on the basis of observed procedures in the village.

/Pp. 130-139 contain no data on Bang Chan and the Central Thai and were not processed for the AO7 Central Thai file./